

## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.



u S21  
A75464  
Cop. 2

(5)

Physical, Biological, and  
Cultural Resources of the  
Gund Research and Demonstration Ranch  
Nevada

U.S. D. A.  
LIBRARY  
JUL 26 1980  
CURRENT SERIAL RECORDS

U.S. Department of Agriculture  
Science and Education Administration  
Agricultural Reviews and Manuals • ARM-W-11/June 1980



Physical, Biological, and  
Cultural Resources of the  
Gund Research and Demonstration Ranch  
Nevada

Edited by  
James A. Young and  
Raymond A. Evans

The Gund Research and Demonstration Ranch is a University of Nevada Agricultural Experiment Station facility in central Nevada for Cooperative Range-Forage-Livestock Research.

This publication is available from the Renewable Resource Center, University of Nevada, 920 Valley Road, Reno, Nev. 89512.

International Standard Serial Number (ISSN) 0193-3760

Science and Education Administration, Agricultural Reviews and Manuals, Western Series, No. 11, June 1980

---

Published by Agricultural Research (Western Region), Science and Education Administration, U.S. Department of Agriculture, Oakland, Calif. 94612

## CONTRIBUTORS

### Introduction, Geology, and Soils

James A. Young, range scientist, U.S. Department of Agriculture,  
Science Education Administration, Agricultural Research, Reno, Nev.

### Climate

John C. Brown, research assistant, University of Nevada, Reno

### Vegetation With Annotated List of Plants

Bruce Roundy, range scientist, U.S. Department of Agriculture,  
Science and Education administration, Agricultural Research, Reno

### Wildlife With Annotated List of Mammals, Birds, Reptiles, and Amphibians

Kent McAdoo, research assistant, University of Nevada, Reno

### Cultural Artifacts in Grass Valley

Robert Elston, research associate, University of Nevada, Reno

### Purpose of Gund Research and Demonstration Ranch and its Range-Forage-Livestock Research Program

Anthony L. Lesperance, Professor of Animal Science, University of  
Nevada, Reno

## ABSTRACT

Research on rangelands for the development of improved methods for enhancement of forage and livestock production cannot only be concerned with forage plants and animals for red meat production. The total environment of rangelands and the impact of range management practices on this environment must be considered. This study concerned the benchmark parameters of geology, soil, climate, plants, plant communities, animals, and cultural resources that must be established in a wildland ecosystem in order to interpret the influences of range management practices. The study area for this investigation was located in central Nevada in a sagebrush (*Artemisia*)/grassland ecosystem. In the broadest terms, the results apply to the sagebrush/grasslands of the Western United States that constitute roughly 10 percent of the land area of the adjacent 48 States. Specifically, the results reflect the sagebrush/needlegrass (*Stipa*) grasslands of the more arid portions of the intermountain area. The list of plants and animals presented is annotated to provide background information on how the plants fit together in communities that provide habitat for the animal populations.

**KEYWORDS:** plants, plant communities, wildlife, birds, small mammals, reptiles, cultural resources, rangelands, range management environmental study, sagebrush, grasslands, wildland ecosystem.



## CONTENTS

|  | Page |
|--|------|
| Introduction.....  | 1    |
| Geology.....   | 5    |
| Alluvial fans.....   | 6    |
| Pluvial Lake Gilbert.....  | 6    |
| Lacustrine deposits.....   | 8    |
| The playa.....   | 8    |
| Subaerial deposits.....  | 9    |
| Hot springs.....   | 9    |
| Soils.....   | 10   |
| Alluvial fan.....  | 10   |
| Saline/alkaline lowlands.....  | 13   |
| Climate.....   | 14   |
| Temperature.....   | 14   |
| Precipitation.....   | 14   |
| Other weather characteristics.....   | 15   |
| Specific climate.....  | 15   |
| Vegetation.....  | 15   |
| Mountain brush.....  | 17   |
| Pinyon/juniper woodlands.....  | 17   |
| Sagebrush/grasslands.....  | 18   |
| Alluvial fan plant communities.....  | 18   |
| Saline/alkaline areas.....   | 19   |
| Shrub-dominated communities.....   | 21   |
| Salt desert shrub communities.....   | 23   |
| Annotated list of plants.....  | 24   |
| Wildlife.....  | 44   |
| Annotated list of mammals.....   | 46   |
| Annotated list of birds.....   | 51   |
| Annotated list of reptiles and amphibians.....   | 62   |
| Cultural artifacts in Grass Valley.....  | 64   |
| Purpose of the Gund Research and Demonstration Ranch<br>and its forage-range-livestock research program..... | 68   |
| Literature cited.....  | 69   |
| Glossary.....  | 72   |

## List of Tables

|   | Page |
|---|------|
| Table 1.--Analyses of hot water collected from Walti Hot Springs and Hot Springs Point, Grass Valley, Nev.....  | 10   |
| Table 2.--Typical pedon of Dotard stony loam from alluvial fan at the Walti Unit of the Gund Research and Demonstration Ranch, Grass Valley, Nev.....             | 12   |
| Table 3.--Typical pedon of Gund silt loam soil from saline/alkaline bottom lands at the Walti Unit, Gund Research and Demonstration Ranch, Grass Valley, Nev..... | 13   |
| Table 4.--Shrub and grass cover, frequency, and density for a Wyoming big sagebrush/green rabbitbrush community...  | 19   |
| Table 5.--Environmental zones of the study area in relation to cultural analysis.....   | 66   |
| Table 6.--Environmental setting, site type, and age of sites in the study area.....   | 67   |

## List of Figures

|   |    |
|---|----|
| Figure 1.--Location of Gund Research and Demonstration Ranch.....   | 2  |
| Figure 2.--Walti and Allen Units of the Gund Research and Demonstration Ranch.....                                  | 4  |
| Figure 3.--Alluvial fans of the Gund Research and Demonstration Ranch showing relative age of the various fans..... | 7  |
| Figure 4.--Transect from top of Simpson Park Range across Grass Valley to Hot Springs Point.....                    | 11 |
| Figure 5.--Transect from top of alluvial fans through saline/alkaline bottom lands to edge of playa.....            | 16 |
| Figure 6.--Distribution of plant communities on Walti Unit of Gund Research and Demonstration Ranch.....            | 20 |



## PHYSICAL, BIOLOGICAL, AND CULTURAL RESOURCES OF THE GUND RESEARCH AND DEMONSTRATION RANCH, NEVADA

Edited by James A. Young and Raymond A. Evans<sup>1</sup>

### INTRODUCTION

Western rangelands are among the greatest natural resources of the nation. This resource includes tremendous potential for public recreation, mineral wealth, watersheds and wildlife habitats, and abundant timber and forage. Much western rangeland is publicly owned and managed by either the Forest Service or the Bureau of Land Management (BLM).

Recent legal action (U.S. District Court, District of Columbia, 1974<sup>2</sup>) and the resultant decision to prepare environmental statements of rangeland uses have focused attention upon the importance of public rangelands and their role in supplying forage for the nation's beef herds. Today, some 8.4 million cows spend an average of 3 months each year on public lands. The continued use of this resource is totally dependent upon the establishment of judicious and scientifically sound resource management.

---

<sup>1</sup>Range scientists, Renewable Resource Center, University of Nevada, 920 Valley Road, Reno, Nev. 89512.

<sup>2</sup>The year in *italics*, when it follows the author's name, refers to Literature Cited, p. 69.

The effective use and management of public rangelands and deeded lands for forage production are among the most important and challenging problems facing the livestock industry and public land management agencies in the Western United States. Improvement of deeded lands through brush and weed control and seeding of forage species is critically important now that the use of public lands by the livestock industry is decreasing as a result of implementation of environmental statements by the BLM.

Unfortunately, there are few western rangeland research stations in which the many facets of multiple and integrated use of both public and private lands can be studied. Nevada is a logical choice for this type of concentrated research because 87 percent of its land is in the public domain.

The Gund Research and Demonstration Ranch of the University of Nevada is becoming one such research facility. It is located in Grass Valley, which lies in portions of Lander and Eureka Counties in central Nevada (fig. 1). The ranch consists of the 2,400-acre (972-ha) Walti Unit, the 320-acre (130-ha) Allen Unit, and 8,000-acres (3240-ha) recently transferred to the University of Nevada from the BLM. Both the Walti and Allen units were donated to the University by

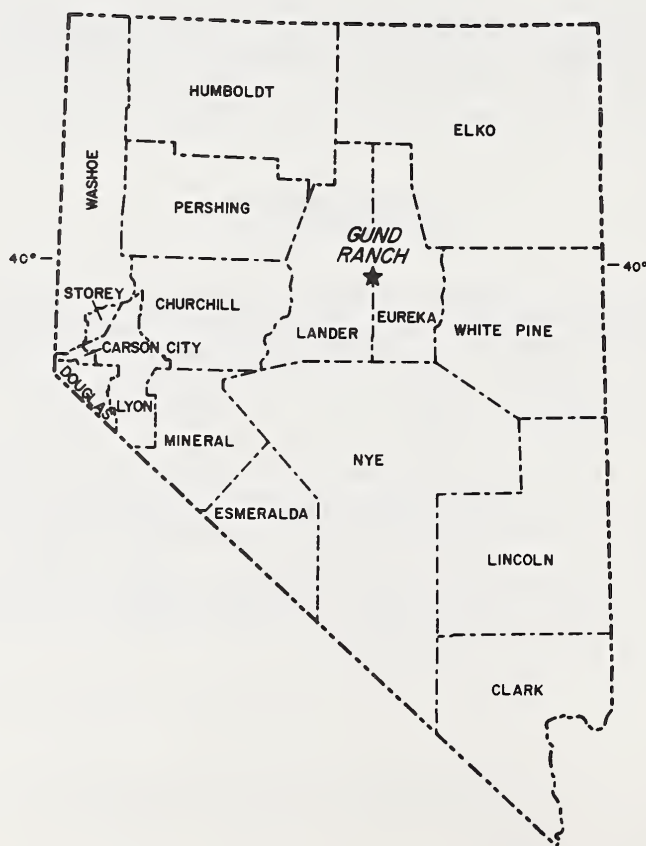


Figure 1.--Location of Gund Research and Demonstration Ranch.



George Gund III (fig. 2). The properties and associated grazing privileges on adjacent National Resource Lands are operated as research and demonstration facilities by the Nevada Agricultural Experiment Station of the Max C. Fleischmann College of Agriculture. Cooperative range research programs conducted by the U.S. Department of Agriculture, Science and Education Administration-Agricultural Research (USDA, SEA-AR) at the ranch contribute to the research effort on range-livestock operations. Results of this research can be extrapolated and applied in Nevada and in adjacent States of the intermountain west.

Grass Valley and adjacent central Nevada comprise one of the most remote areas in the contiguous 48 States of the United States. The high valleys of central Nevada are separated by towering fault-block mountain ranges arranged in echelons with the ridgelines oriented roughly north to south. Everything is on a large scale in central Nevada except the density of human population. Viewed from any crest of the mountains, the landscape appears to consist of an endless series of bluish-silver ridges diminishing in magnitude at the horizons. Viewed from the center of one of the large valleys, the landscape appears to consist of an immense flat whose association with the mountain ranges is indistinct because of the omnipresent heat mirage and the intense glare reflecting from light-colored, often salt-encrusted soils. Russell (1885) described central Nevada as a place where the mountains did not have enough vegetation to clothe their nakedness, and you could ride in the valleys all day on horseback and never find sufficient shade for horse or rider.

This area is on the verge of a dynamic period of resource development. Central Nevada has known several cycles of mineral exploitation. Austin and Eureka, the county seats of Lander and Eureka Counties, were centers of silver mining beginning in the 1860's. Mineral and gem stone mining are still important in the economics of the new small towns also, exploration for gas, oil, and geothermal energy is actively underway in the area. The lure of open space, historic mining relics, and hunting for mule deer and upland birds attract an increasing number of visitors to central Nevada.

The alluvial soils of the margins of the valleys of central Nevada are suitable for crop production. The constraints of a short growing season and long distances from markets render these areas most suited for forage production. Any agricultural development is predicated on (a) the implementation of homesteading, (b) the development of an agrarian movement of those willing to forego 20th-century conveniences for the hardships of homesteading, and (c), most importantly, the development of an economical energy source for pumping ground water for irrigation.

The most extensive natural resource of central Nevada is grazing lands. These predominantly sagebrush rangelands have been degraded by a century of use to the point where they are producing at a fraction of their potential.

In the 21st century, the demand for food, energy, minerals, and recreation will have a tremendous impact on central Nevada. Detailed knowledge of the vegetation and animals that comprise the rangeland communities of central Nevada is required if we are to mitigate the impact of and provide for all the demands placed on these resources.



## GEOLOGY

The most striking geologic feature in the immediate environs of the Gund Research and Demonstration Ranch is the towering escarpment of the Simpson Park Range directly to the east of the Walti Hot Springs. McClusky Peak, 8,481 feet (2584 m) in elevation, caps the range on the eastern side of Grass Valley. Like most of the north- to northeast-trending mountain ranges in central Nevada, the Simpson Park Range is bounded on the west side by fault scarps. Recent movement along the faults has tilted the range eastward and steepened the western flanks.

The sedimentary rocks of the Simpson Park Range are generally representative of a large portion of north-central Nevada. The Paleozoic stratigraphy and structure of central Nevada have been largely illuminated by the investigations and writings of R. J. Roberts (for example, Roberts et al., 1967). In general, central Nevada rocks of the Cambrian or the Early Mississippian period were laid down in a broad geosyncline. A carbonate assemblage was deposited on the east, and a siliceous and volcanic assemblage, on the west. In the Late Devonian and Mississippian periods, during the Antler orogeny (mountain forming period), these rocks were folded, and the western assemblage was thrust over the eastern assemblage along the Roberts Mountains thrust fault.

In the Simpson Park Range north of Fagin Mountain (at the southeastern end of Grass Valley) are found western-assemblage rocks that include the Vinini Formation as undivided Silurian and Ordovician rocks. They are principally chert and shale in the lower part of the section, overlain by quartzite, shale, and some chert, which, in turn, are overlain by shale, sandstone, and some limestone. The shale in the lower part of the section is black and gray. Above the black shale zone are green cherts and some phyllitic shales that weather to brownish shades. Along many of the bedding planes, this zone characteristically contains green chert nodules measuring 1 inch (2.5 cm) in diameter. Above the green chert are brown chert and massive beds of brown quartzite. The quartzites are very resistant to weathering and form prominent ribs. The quartzites are less prominent higher in the section, and massive beds of brown chert are interbedded with brown siliceous shales. Above these, in the Underwood Canyon area on the west flank of the range, are sandstones, shales, and some limestone.

Not all the rocks in the Simpson Park Range are sedimentary. Just north-east of the Walti headquarters, the Keystone window in the Simpson Park Range is a stack of intrusive granodiorite. The rock is medium to dark gray and medium grained.

The structure of the Simpson Park Range is complex. Only occasional windows of the eastern assemblage of sedimentary rocks are exposed where the over-riding western assemblage has eroded away. East of Underwood Canyon, the western-assemblage Paleozoic rocks are folded into a northward-plunging anticline that strikes to the northwest diagonally across the crest of the range. Farther north, in the vicinity of McClusky Pass, the structure in the older rocks is obscured by volcanic rocks and gravels.

At the far north end of Grass Valley, the landscape is dominated by Mount Tenabo, 9,162 feet (2791 m) in elevation. Mount Tenabo is the southern terminus of the Cortez Mountains. With prominent, near-vertical reefs of limestone forming an S-curve across the southern escarpment, Mount Tenabo is a distinctive landform.



The northwestern boundary of Grass Valley is defined by the eroded, rugged topography of the Sawtooth Mountains and the more rounded landforms of the Bald Mountain (8,553 feet; 2606 m) in the Hot Springs Point Range. Both ranges combine to separate Grass Valley from Calico Lake Valley to the west. The southwestern portion of Grass Valley is in the shadow of Mount Callaghan (10,187 feet; 3104 m) of the Toiyabe Mountain Range.

The various geologic formations exposed in the mountain ranges provide the parent material of the development of shallow soils on the often steep surfaces. The erosion products from the mountains are washed down the steep canyons and dumped at the mouth of the canyons, forming a piedmont of alluvial fans.

## Alluvial Fans

The bases of the mountains in central Nevada are surrounded by alluvial fans spreading out from the mouths of canyons. These piedmonts of alluvial material are the most important sites for big sagebrush-dominated plant communities.

The shape, degree of textural sorting, and slope of the fans are determined by the size of the watershed and the resulting amount of waterflow from the parent canyon. The short and very steep draws immediately east of the Waltho Hot Springs have dumped steep cones of alluvium at their mouths. McClusky Creek, which is a perennial stream for much of its course, has established a broad, nearly level alluvial fan several thousand acres in extent, spreading from the Simpson Park Range to the lower portion of the Allen Unit. The McClusky Creek fan supports soils derived from well-sorted alluvium, with traces of numerous abandoned stream channels. This type of fan usually supports soils and landforms suitable for intensive, irrigated agriculture.

The location, area, and ages of alluvial fans on and adjacent to the Gund Research and Demonstration Ranch have been mapped (fig. 3). The oldest landforms are alluvial fans deposited during the Pleistocene epoch or Ice Age, the last geologic epoch before the current or Holocene epoch. Pleistocene epoch fans are exposed in profiles at the mouth of Potato Canyon as steep bluffs where Potato Canyon Creek has eroded through the old fan. At the base of the Potato Canyon alluvial bluffs, the stream is currently eroding a younger fan that probably dates from the early Holocene. These more recent fans are common at the mouths of most of the canyons along the Simpson Park Escarpment. At some of the canyon mouths, the early Holocene fans have been covered by much younger alluvium. Such is the case on the southern edge of the Big Canyon fan immediately southeast of the Gund Ranch.

## Pluvial Lake Gilbert

During the Pleistocene, recurring periods of colder and slightly more moist climatic conditions resulted in glaciers forming in the Sierra Nevada, the Wasatch Mountains, and the highest mountain ranges of the interior of the Great Basin. In the interior of the Great Basin, the glaciers were restricted to the highest mountain areas and generally did not extend to the valleys. The cli-



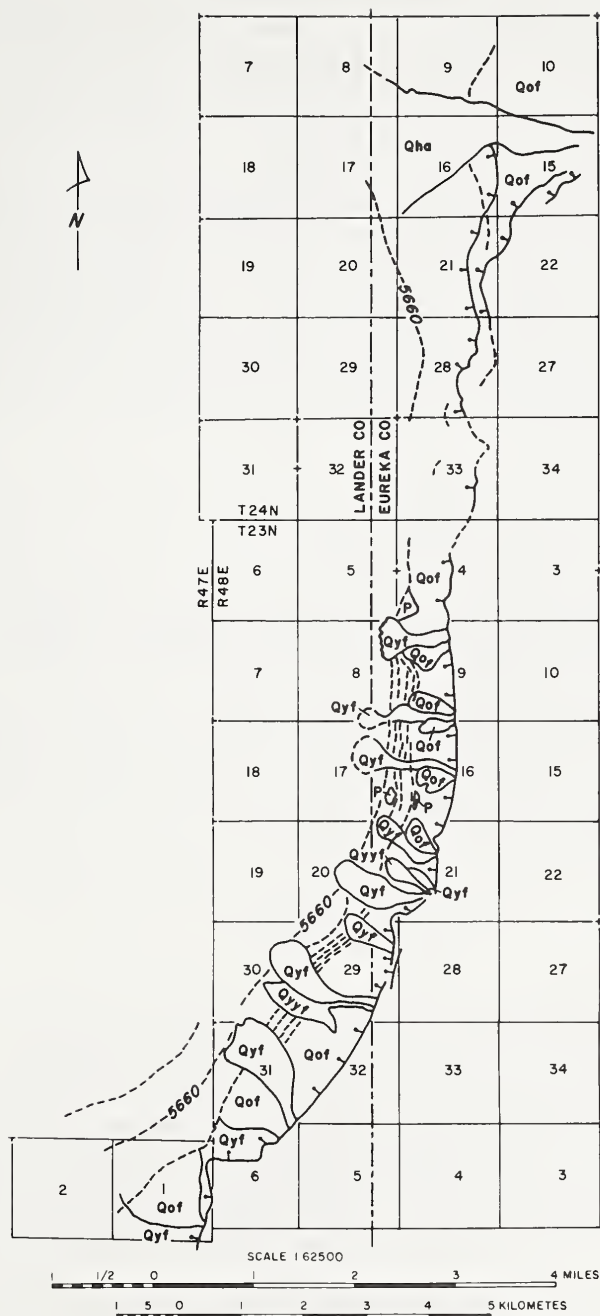


Figure 3.--Alluvial fans of the Gund Research and Demonstration Ranch showing relative age of the various fans. Qha - Holocene alluvium along McClusky Creek; Qyyf - Youngest Holocene alluvial fans; Qyf - Older Holocene alluvial fans; p - Lagoons/playas dammed by beach ridges, Pleistocene shore features, Early Holocene shore features, Pleistocene fault, balls on downthrown side; Qof - Old fans, Pre-Holocene-Pleistocene, oldest Quaternary surface.

matic changes, however, altered the evaporation regimes in the hydrographic basins of the Great Basin. The water that flowed down the canyons from the mountains spread out in the valleys and accumulated in freshwater lakes. In northwestern Nevada, many of the valley lakes spilled and joined to form the giant Lake Lahontan system. A similar lake system, formed in western Utah, was the Bonneville system, of which the Great Salt Lake is the remnant.

In Grass Valley, a lake about 250 feet (76 m) deep formed that had a watershed of 543 square miles (1406 km<sup>2</sup>). Hubbs and Miller (1948) believed that the pluvial lake in Grass Valley spilled over the valley lip, and the overflow drained down the canyon by the Cortez Mountains to Crescent Valley and, eventually, to Lake Lahontan. A more recent investigator questions whether the pluvial lake ever spilled (personal communication from Jonathan Davis). Hubbs and Miller christened the pluvial lake of Grass Valley "Lake Gilbert" in honor of Grove Karl Gilbert, the original investigator of the Great Salt Lake and Lake Bonneville.

Lake Gilbert has had a tremendous influence on the environment of Grass Valley. The pluvial lakes of the Great Basin filled and desiccated in great cycles in rhythm with the advance and retreat of the glaciers (Russell 1885). Within each of these general cycles were minor periods of fluctuating lake levels. These levels are marked by a series of wave-cut beaches that truncate the alluvial fans at the base of the Simpson Park Range. The Potato Canyon and Big Canyon fans are particularly expressive of these beach ridges.

Through the Walti Unit, a prominent beach ridge at 5,660 feet (1724 m) elevation marks the last rise of Lake Gilbert in early Holocene times. Wave action sorted the alluvial material and left a prominent gravel bar along most of this beach. Nodules of green chert eroding from the Simpson Park Range are prominent in these gravels.

## Lacustrine Deposits

The increased precipitation of the glacial-pluvial period during the Pleistocene eroded large amounts of clay and silt from the tectonically active mountain ranges and deposited the material in Lake Gilbert. The fine particles initially stayed suspended in the lake waters and finally were precipitated in deep water areas. Because the lake basin was closed during much or all of its history, all the soluble salts that were washed from the eroding sedimentary strata in the mountains were precipitated in the basin when the waters evaporated. The result of this closed lake action is that the floor of Grass Valley has predominantly saline/alkaline soils with silty, silty-clay, or clay textures.

## The Playa

The deepest part of Lake Gilbert was in the northern part of Grass Valley. The major source of sediments was in the south (Callaghan Creek). These factors together formed a textural gradient with silts to the south and fine clays further north.

After winters with above-average precipitation and after occasional summer thunderstorms, a seasonal lake forms on the playa at the north end of the valley. The playa is a nearly level expanse of clay-textured lake sediments 15 miles (24 km) long and 1 to 13 miles (1.5 to 21 km) wide. This is the evaporation surface for runoff water that reaches the center of the valley. Very few of the streams reach the playa. Callaghan Creek is the major tributary that has to flow across 20 miles of lake sediments to reach the playa. McClusky Creek is normally blocked from reaching the playa by mud dunes. The playa in Grass Valley is a deflation (lowered) surface, only occasionally renewed by waterborne sediments. The playa surface is deflated 10 to 15 feet (3 to 4.5 m) below bordering vegetated areas adjacent to the Walti Ranch. The prevailing wind deposits the eroded particles on the northeastern side of the playa, starting south of the Allen Unit. When dry, the clay particles become cemented together by salts and assume the characteristics of sand particles, which causes formation of the dunes. Once the dunes become wet, they dissolve back to clay-textured particles, hence the popular name of mud dunes.

### Subaerial Deposits

The mud dunes are not the only wind deposits of importance in Grass Valley. There is considerable evidence that the last interglacial period was much drier than the current period. During this previous dry period and during the dry altithermal (warm climate) period in the early Holocene, there were periods of extreme deflation of fine-textured soil particles and soluble salts from the valley floor.

On the Walti Unit, deposits of silt-textured material, apparently wind eroded from the valley floor, are found trapped behind beach ridges, where they were washed into lagoons after reeroding from the fans.

### Hot Springs

There are three major groups of geothermal springs on or adjacent to the Walti Unit of the Gund Ranch. The largest group is the Walti Hot Springs. They are located on the east side of the valley at the base of the Simpson Park Range and are surrounded by the Gund Ranch headquarters buildings. Located directly across the playa from the Walti Hot Springs are the isolated and seldom-visited Little Hot Springs. The third set of geothermal springs is also located on the west side of Grass Valley, about 3 miles (5 km) to the north of the Little Hot Springs and opposite Hot Springs Point of Bald Mountain.

The Walti Hot Springs are the reason that the Walti Ranch was located in Grass Valley. The overflow from the springs creates several hundred acres of meadow. The Waltis increased the meadow area by water spreading to permit the production of enough hay to winter their brood cows.

The waters of Walti Hot Springs are hot (163°F; 73°C) and slightly acid (table 1). Despite the content of salts, especially  $MgSO_4$ , the water is potable.

Table 1.--Analysis of water collected from Walti Hot Springs and Hot Springs Point, Grass Valley, Nev.<sup>1</sup>

| Characteristic                   | Hot Springs Point | Walti Hot Springs |
|----------------------------------|-------------------|-------------------|
| Temperature:                     |                   |                   |
| °F                               | 138.2             | 163               |
| °C                               | 59                | 73                |
| pH                               | 6.8               | 6.9               |
| Mineral (and salt) content, p/m: |                   |                   |
| SiO <sub>2</sub>                 | 72                | 75                |
| Fe                               | .04               | .02               |
| Mn                               | .09               | 0                 |
| Ca                               | 54                | 60                |
| Mg                               | 38                | 13                |
| Na                               | 277               | 48                |
| K                                | 51                | 15                |
| Li                               | 1.0               | 0                 |
| HCO <sub>3</sub>                 | 928               | 282               |
| CO <sub>3</sub>                  | 0                 | 0                 |
| SO <sub>4</sub>                  | 116               | 62                |
| Cl                               | 49                | 13                |
| F                                | 6.9               | 2.4               |
| NO <sub>3</sub>                  | 3.3               | .1                |
| PO <sub>4</sub>                  | 0                 | .1                |
| B                                | 1.6               | .17               |

<sup>1</sup> Samples collected by G. C. Simmons and analyzed by P. Brennans, U.S. Geological Survey, as given by Roberts et al. (1967).

## SOILS

A topographic transect illustrates the geology, soils, and accompanying vegetation typically found at the Gund Research and Demonstration Ranch and adjoining area (fig. 4). The soils of the deeded land portion have been described and mapped by the Soil Conservation Service, U.S. Department of Agriculture. Most of the deeded land is below the minimum level of Lake Gilbert, so the soils described are predominantly saline/alkaline, clay-textured soils.

## Alluvial Fan

Just south of the Walti Hot Springs is a small area of alluvial fan that was included in the soil survey. The soils of this fan were described as members of the Dotard series (table 2). The Dotard series consists of very deep, well-

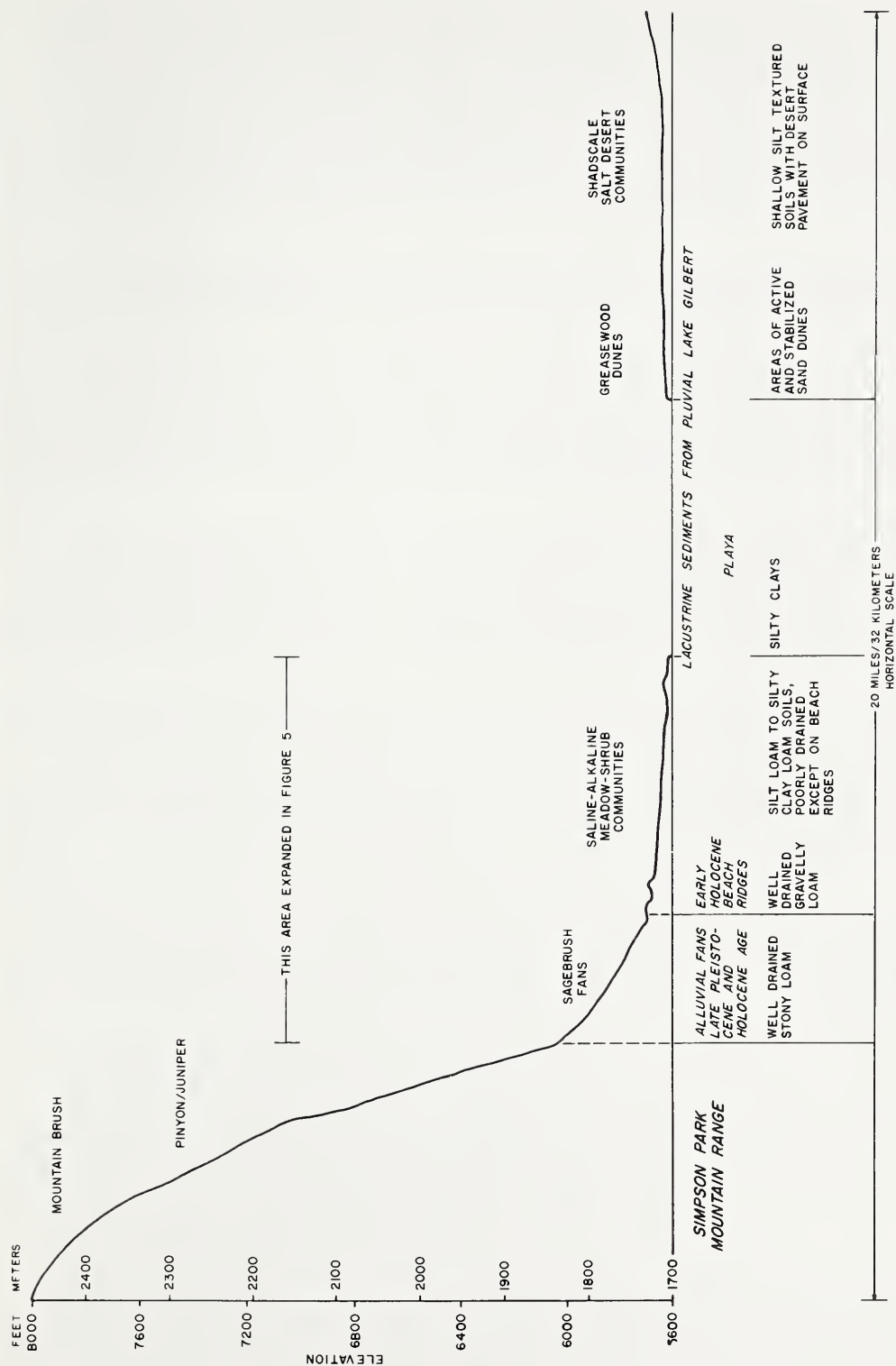


Figure 4.--Transect from top of Simpson Park Range across Grass Valley to Hot Springs Point.



drained soils formed in calcareous alluvium from mixed rock sources. The A<sub>1</sub> horizon textures are modified, with 20 to 30 percent rock fragments with as much as 10 percent stones common in some pedons. Reactions range from mildly to strongly alkaline. Horizons with lenses of loamy sand are common in most pedons.

High concentrations of calcium carbonates are common in the A and upper C horizons, decreasing with depth. A calcium carbonate equivalent of 25 to 40 percent is common in these horizons.

Table 2.--*Typical pedon of Dotard stony loam from alluvial fan at the Walti Unit of the Gund Research and Demonstration Ranch, Grass Valley, Nev.*

---

A<sub>11</sub>-- 0 to 3 inches (0 to 8 cm); light-brownish (2.5Y 6/2) stony loam, dark-grayish brown (2.5Y 4/2) when moist; strong, thin platy structure; slightly hard, very friable, slightly sticky, slightly plastic; commonly very fine roots; many very fine vesicular pores; 20 percent gravel and stones; violently effervescent, moderately alkaline (pH 8.4); clear, wavy boundary.

A<sub>12</sub>-- 3 to 9 inches (8 to 23 cm); light-brownish gray (2.5Y 6/2) gravelly loam, dark brown (10YR 4/2) when moist; moderate fine and medium subangular blocky structure; lightly hard, very friable, sticky, plastic; many very fine, fine, and commonly medium roots; commonly very fine tubular pores; 25 percent gravel; violently effervescent; moderately alkaline (pH 8.4); abrupt wavy boundary.

C<sub>1ca</sub>-- 9 to 14 inches (23 to 36 cm); pale-brown (10YR 6/3), extremely gravelly loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, sticky, plastic; commonly very fine and fine and few medium roots; commonly very fine tubular pores; 60 percent gravel; secondary carbonates coat underside of gravels; violently effervescent; moderately alkaline (pH 8.4); abrupt wavy boundary.

C<sub>2ca</sub>-- 14 to 20 inches (36 to 50 cm); light-gray (10YR 7/2), very gravelly loam, dark brown (10YR 4/3) when moist; massive; hard, firm, sticky, slightly plastic; few very fine and fine roots; many very fine tubular pores; 40 percent gravel; many fine secondary carbonates in filaments; violently effervescent; strongly alkaline (pH 8.6); clear wavy boundary.

II C<sub>3ca</sub>-- 20 to 40 inches (50 to 102 cm); brown (10YR 5/3), extremely gravelly sandy loam, dark-yellowish brown (10YR 4/4) when moist; massive, soft, very friable, slightly sticky, nonplastic; many very fine roots; commonly very fine tubular and interstitial pores; 70 percent gravel; commonly fine secondary carbonates in filaments and coating underside of pebbles; violently effervescent; strongly alkaline (pH 8.6); clear irregular boundary.

II C<sub>4</sub>-- 40 to 60 inches (102 to 152 cm); brown (10YR 5/3), extremely gravelly sandy loam, dark-yellowish brown (10YR 4/4) when moist; massive, soft, very friable, slightly sticky, slightly plastic; few very fine roots, commonly very fine tubular and interstitial pores; 65 percent gravel; violently effervescent; strongly alkaline (pH 8.6).

---

## Saline/Alkaline Lowlands

On the roughly 2,400 acres (972 ha) of saline/alkaline lowlands in which the soils were surveyed at the Walti Unit, 11 soil series were described. Obviously, there is a great deal of variation in these soils, and it is impossible to establish a single representative series. One of the most widely occurring soils, however, is the Gund series, which was established on the Walti Unit (table 3).

Table 3.--*Typical pedon of Gund silt loam from saline/alkaline bottom lands at the Walti Unit, Gund Research and Demonstration Ranch, Grass Valley, Nev.*

---

A<sub>1</sub>-- 0 to 4 inches (0 to 10 cm); pale-brown (10YR 6/3) silt loam, dark brown (10YR 3/3) when moist; moderate thin and medium platy structure; soft, very friable, sticky, slightly plastic; commonly very fine and fine roots; many very fine interstitial and vesicular pores; strongly alkaline (pH 8.7); gradual smooth boundary. (3 to 6 inches; 7.6 to 15.2 cm thick)

C<sub>1</sub>si-- 4 to 14 inches (10 to 35 cm); pale-brown (10YR 6/3) silt loam, brown (10YR 4/3) when moist; moderate thin and medium platy structure; hard, friable, sticky, plastic; commonly very fine and fine roots; commonly very fine tubular pores; 40 percent discontinuous weak silica cementation; strongly alkaline (pH 9.0); gradual smooth boundary. (6 to 12 inches; 15 to 30 cm thick)

C<sub>2</sub>si-- 14 to 23 inches (35 to 58 cm) thick; very pale-brown (10YR), very gravelly loam, pale.

C<sub>2</sub>ca-- 14 to 20 inches (35 to 50 cm); light-gray (10YR 7/2), very gravelly loam, dark brown (10YR 4/3) when moist; massive; hard, firm, sticky, slightly plastic; few very fine and fine roots; many very fine tubular pores; 40 percent gravel; many fine secondary carbonates in filaments; violently effervescent; strongly alkaline (pH 8.6); clear wavy boundary.

II<sub>1</sub>C<sub>3</sub>ca-- 20 to 40 inches (50 to 102 cm); brown (10YR 5/3), extremely gravelly sandy loam, dark-yellowish brown (10YR 4/4) when moist; massive, soft, very friable, slightly sticky, nonplastic; many very fine roots; commonly very fine tubular and interstitial pores; 70 percent gravel; commonly fine secondary carbonates in filaments and coating underside of gravels; violently effervescent; strongly alkaline (pH 8.6); clear irregular boundary.

II<sub>1</sub>C<sub>4</sub>-- 40 to 60 inches (102 to 152 cm); brown (10YR 5/3), extremely gravelly sandy loam, dark-yellowish brown (10YR 4/4) when moist, massive, soft, very friable, slightly sticky, slightly plastic; few very fine roots, commonly very fine tubular and interstitial pores; 65 percent gravel; violently effervescent; strongly alkaline (pH 8.6).

---

The soils of the Gund series are very deep soils on the basin floors. They are formed on silty alluvium over lacustrine sediments. Typically, the surface layer is pale-brown salt- and sodium-affected silt loam about 4 inches (10 cm)

thick. The upper 19 inches (48 cm) of the underlying material is pale-brown silt loam that is weakly silica cemented in the lower part. The lower part of the profile, to a depth of 60 inches (152 cm), is light-gray and pale-yellow lacustrine clay. Permeability of the Gund soils is slow. Available water-holding capacity is high. These soils are strongly salt and sodium affected.

## CLIMATE

The climate of more than half of Nevada, including the Gund Research and Demonstration Ranch area, is generally classified as "mid-latitude steppe," a subdivision of the "dry" classification in the scheme developed by Koppen in 1918 (Houghton et al., 1975). The climate is characterized by cold winters and hot, dry summers. Potential evaporation greatly exceeds precipitation, limiting the success of many types of vegetation without irrigation. Houghton et al. (1975) provide probably the best general description of the area's climate. They use data from various weather stations with long term records, such as Austin, Eureka, and Elko, to develop mean and extreme values for temperature, precipitation, snowfall, evaporation, and other weather characteristics. These data are then extrapolated to areas between stations, such as the Gund Research and Demonstration Ranch.

### Temperature

From the above-mentioned publication and the short term records available for the Gund Research and Demonstration Ranch, we see that mean annual temperatures range from 45° to 48°F (7° to 9°C). Mean January minimum temperatures are cold, 12° to 16°F (-11° to -9°C), and mean July maximum temperatures average around 88°F (31°C). Summer temperatures above 90°F (32°C) can be expected 20 to 30 days a year. The first freeze is usually in late August or early September. The average frost-free season is 90 to 110 days (an average of 71 days in the last 7 years); the short growing season limits the success of many plant species.

### Precipitation

Annual precipitation for the ranch varies considerably with geography. The playa area to the northwest averages 8 to 10 inches (20 to 25 cm) of moisture a year. The amount apparently increases with elevation eastward and latitude southward towards the town of Austin. The alluvial fan areas of the ranch receive 10 to 14 inches (25 to 36 cm) a year, and the Simpson Park Range to the east receives 14 to 20 inches (36 to 51 cm) a year. Snowfall follows a similar pattern, with yearly averages of 10 to 60 inches (25 to 152 cm). Most precipitation occurs in the spring. Summer and early fall are dry, with an average of between 2 and 3 inches (5 to 8 cm) for the 3-month period of July through September. Measurable precipitation (more than 0.01 inch; 0.25 mm) occurs 60 to 80 days a year, and thunderstorms can be expected 15 to 20 days a year--usually in the summer and early fall. Thunderstorms frequently bring high-intensity rainfall; an intensity of 6 inches (15 cm) per hour was recorded for 5 minutes at the ranch in the summer of 1977 (unpublished data, University of Nevada).



## Other Weather Characteristics

The Gund Research and Demonstration Ranch receives an average of 70 to 75 percent of maximum possible sunshine; the area north of Elko receives 65 to 70 percent, and the desert south of Las Vegas more than 85 percent. Annual pan evaporation averages 48 to 50 inches (122 to 127 cm) per year. Prevailing winds are from the west and often darken the area with clouds of fine material from the playa.

## Specific Climate

Climatic data specific to this area are very scarce. The Gund Research and Demonstration Ranch itself reports daily maximum and minimum temperatures, total precipitation, and some snowfall data to the National Weather Service. These data have been published under the listing of "Beowawe U. of N. Ranch" since 1972. In connection with current research activities at the ranch, a network of nine nonrecording precipitation gages was established in April 1977. In August of that year, three recording gages were added at strategic locations.

Data from other weather stations in the area may be used for some purposes, although none can be considered directly applicable to the Gund Research and Demonstration Ranch. The Cortez Gold Mines have 11 years of temperature and precipitation records. This station is close to the ranch, about 25 miles (40 km) away, but, at 4,900 feet (1493 m), the station is 750 feet (228 m) lower in elevation. The Central Nevada Field Laboratory reports 14 years of records for temperature, precipitation, and pan evaporation. This station is comparable in elevation at 5,950 feet (1813 m) but is at least 50 miles (80 km) away, in another valley. The town of Austin has long term records (80 years) but is located in a mountain canyon, not similar at all to the lower alluvial fan location of the Gund Ranch. As research activities progress, more climatic data specific to the ranch will probably be available.

## VEGETATION

The vegetation of the deeded land at the Gund Research and Demonstration Ranch is primarily composed of saline/alkaline plant communities; however, in the adjacent alluvial fans and mountain escarpments, most of the characteristic vegetation formations of central Nevada can be found. The land recently transferred from the BLM (about 8,000 acres; 3240 ha) is partially composed of alluvial fan plant communities (fig. 5).

Plant communities are groups of individual plants that have similar environmental tolerances. Nevada's basin and range topography causes high variability in environmental factors over relatively short distances. These factors include soils, temperature, precipitation, moisture relations, and susceptibility to fire or influence by animals. In Nevada, the variety of plant communities reflects differences in habitats or in environmental factors. A knowledge of the occurrence of plants in certain habitats and their association with each

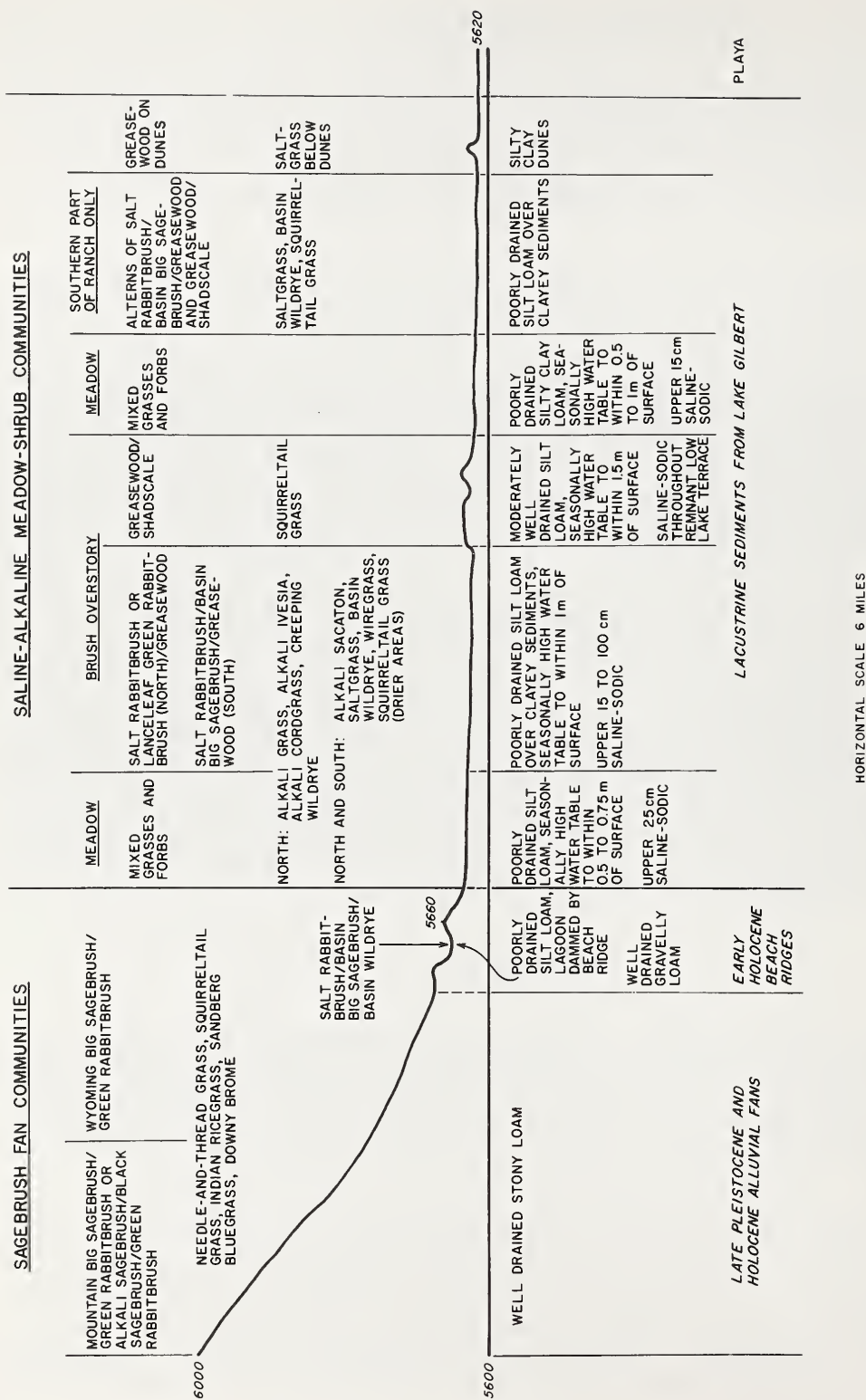


Figure 5.--Transect from top of alluvial fans through saline/alkaline bottom lands to edge of playa.

other in certain plant communities provides a basis for interpreting the ecology of similar areas and for estimating site potentials and past and future responses to alterations in the environment.

## Mountain Brush

Plant communities on the upper slopes of the Simpson Park Range are characterized by a variety of shrub species. Many of the shrub and herbaceous species as well as the topoedaphic position are reminiscent of three-needle pine woodland, but there are no conifers. This life zone is located above the pinyon/juniper woodlands on the Simpson Park Range.

The soils and plant communities of Coils Creek, located due east of Walti Hot Springs, on the opposite side of the Simpson Park Range, have been delineated in detail by Blackburn et al. (1969). Undoubtedly, variations of these plant communities on the western slope have not been described because of the difference in exposure; however, the general classification of communities is valid.

The most mesic slopes in the mountain brush type support an overstory of snowberry (*Symphoricarpos vaccinoides*) and mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*). Bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*), and Thurber's needlegrass (*Stipa thurberiana*) occur as the understory dominants on the upper slopes. Excessive grazing on the lower slopes has resulted in invasion by the alien downy brome (*Bromus tectorum*) in the void left by the removal of these perennial grasses. On the west side of the Simpson Park Range, especially on north-facing slopes in the mountain brush zone, are extensive stands of Great Basin wildrye (*Elymus cinereus*).

Another mountain brush community described by Blackburn et al. (1969) is the big sagebrush (*Artemisia tridentata*)/serviceberry (*Amelanchier pallida*)/snowberry (*Symphoricarpos vaccinoides*) assemblage. Although Blackburn et al. did not specify the subspecies of *Artemisia tridentata*, at this elevation it is probably *vaseyana*.

Many of the high ridges on the Simpson Park Range support low sagebrush (*Artemisia arbuscula* spp. *arbuscula*/Sandberg bluegrass (*Poa sandbergii*) communities. When these low sagebrush communities are found on exposed ridge tops they are called "balds." The shrubs in these balds are nearly flat and parallel to the soil surface. Mountain big sagebrush/Idaho fescue communities occur on the upper slopes of the Simpson Park Range.

## Pinyon/Juniper Woodlands

Below the mountain brush communities, the next major vegetation zone is the pinyon/juniper woodlands. They are composed of plant communities dominated by single-leaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*). These woodlands do not form a continuous band along the mountains. In many parts of the Simpson Park Range, the sagebrush/grasslands extend from the allu-

vial fans to the mountain brush communities. The pinyon/juniper woodlands are often restricted to steep slopes and rocky areas, where topography and understory vegetation combine to limit the spread of wildfires.

There are several types of pinyon, juniper, and pinyon/juniper communities. These species occur in separate communities with both big and low sagebrush. Often the trees have invaded shrub/grasslands from areas relatively safe from wildfire. When this has happened and the trees have not been removed by recurring wildfires, the increasing density of trees has eventually eliminated most shrubs and grasses from the communities.

Important browse species found in and on the margins of pinyon/juniper woodlands are bitterbrush (*Purshia tridentata*) and curleaf mountain mahogany (*Cercocarpus ledifolius*).

Adjacent to springs and in mesic situations, clonal groves of quaking aspen (*Populus tremuloides*) are found sparingly on the mountain escarpment. These groves have specific plant communities associated with their development.

### Sagebrush/Grasslands

Below the pinyon/juniper zone are found the sagebrush/grasslands on the alluvial fans at the base of the mountains. On and adjacent to the Gund Research and Demonstration Ranch, a century of livestock grazing has reduced the native perennial grass portion of the communities until it is difficult to reconstruct their potential vegetation. The perennial grasses that remain, Sandberg bluegrass, squirreltail (*Sitanion hystrix*), Indian ricegrass (*Oryzopsis hymenoides*), and needle-and-thread grass (*Stipa comata*), are not diagnostic of specific environments when they occur as scattered remnants. From the higher-condition plant communities found at higher elevation, we suspect that Thurber's needlegrass and bluebunch wheatgrass may have occurred in specific plant communities on the alluvial fans.

### Alluvial Fan Plant Communities

Three different shrub-overstory communities with generally the same understory are found on the alluvial fans. The upper fans support either alkali sagebrush (*Artemisia longiloba*)/black sagebrush (*A. nova*)/green rabbitbrush (*Chrysothamnus viscidiflorus*) or mountain big sagebrush/green rabbitbrush communities. The lower, drier, and main portions of the fans support a Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*)/green rabbitbrush community. This plant community also is found on well-drained gravelly loam beach ridges at the lower edge of the fans. Native perennial grasses found in these three communities include needle-and-thread grass, squirreltail, Indian ricegrass, and Sandberg bluegrass. Wyoming big sagebrush and the perennial bunchgrasses compete strongly for soil moisture, since their root systems occupy the same depths in the soil profile. Dense cover of Wyoming big sagebrush and low density of perennial grasses in the Wyoming big sagebrush/green rabbitbrush community (table 4) are indicative of a degraded sagebrush-bunchgrass community. Past overuse



of the bunchgrasses has given the competitive advantage to the Wyoming big sagebrush, which has increased in cover and essentially closed the community to any increase in the few remaining perennial grasses, even under proper grazing management. The annual grass downy brome has invaded this degraded community (table 4), taking advantage of early spring moisture and further preventing any natural increase of perennial grasses.

Soils of the alluvial fans are calcareous but not saline or sodic and are well drained and permeable because of their coarse texture. Soil moisture for plant growth is generally unavailable on the lower main portion of the fans by June. A variety of forbs are found on the alluvial fans, although they are not abundant. *Cryptanthas* (*Cryptantha* spp.), wild daisies (*Erigeron* spp.), pussy-toes (*Antennaria* spp.), locoweeds (*Astragalus* spp.), lupine (*Lupinus* spp.), and Indian paintbrush (*Castilleja chromosa*) are most commonly observed.

Table 4.--Shrub and grass cover, frequency, and density for a Wyoming big sagebrush/green rabbitbrush community

| Species               | Cover <sup>1</sup> | Density <sup>2</sup> | Frequency<br>in plots |
|-----------------------|--------------------|----------------------|-----------------------|
|                       | Percent            | Number               | Percent <sup>3</sup>  |
| Wyoming big sagebrush | 25.0               | 13.0                 | 61                    |
| Green rabbitbrush     | 9.0                | 5.0                  | 61                    |
| Sandberg bluegrass    | .3                 | .8                   | 37                    |
| Squirreltail          | .1                 | .1                   | 3                     |
| Indian ricegrass      | ---                | ---                  | 3                     |
| Downy brome           | 4.0                | 25.0                 | 100                   |

<sup>1</sup>Dashes indicate less than 0.1 percent.

<sup>2</sup>Shrubs/100 ft<sup>2</sup> (9.3 m<sup>2</sup>); grasses/5 ft<sup>2</sup> (0.5 m<sup>2</sup>).



<sup>3</sup>Percent occurrence in 100 5 ft<sup>2</sup> (0.5 m<sup>2</sup>) plots.

### Saline/Alkaline Areas

The vegetative composition of the lowland plant communities is influenced by water relations, salt accumulation, and past grazing history. Water and salt relations are determined by the location of springs and drainages with respect to Simpson Park Range on the east and the playa on the west. The distance between the playa and the mountains is shortest on the northern half of the deeded land southward (fig. 6). Abundant hot and cold springs on the northern half of the deeded land near the base of the fans and the short distance between the mountains and the playa result in a consistent seasonally high water table, poor drainage, and high surface salt and sodium accumulations.

Extensive irrigated and natural meadows are near the base of the fans and near the edge of the playa. Because the southern half of the deeded land is

# EXPLANATION

-  SALTGRASS MEADOW
-  MIXED GRASSES-FORB MEADOW
- A ALKALI SAGEBRUSH/BLACK SAGEBRUSH - MOUNTAIN BIG SAGEBRUSH
- B WYOMING BIG SAGEBRUSH/GREEN RABBITBRUSH
- C HAY MEADOW
- D SALT RABBITBRUSH/GREASEWOOD, BASIN WILDRYE, ALKALI GRASS, SALTGRASS, ALKALI SACATON
- E SALT RABBITBRUSH/BASIN BIG SAGEBRUSH/GREASEWOOD, BASIN WILDRYE, SALTGRASS, ALKALI SACATON
- F SALT RABBITBRUSH/BASIN BIG SAGEBRUSH-GREASEWOOD/SHADSCALE
- G WHEAT GRASS
- H ALFALFA
- K PLAYA
- FENCE OR PROPERTY BOUNDARY
- - - - - VEGETATION BOUNDARY
- == ROAD
- RANCH HEADQUARTERS

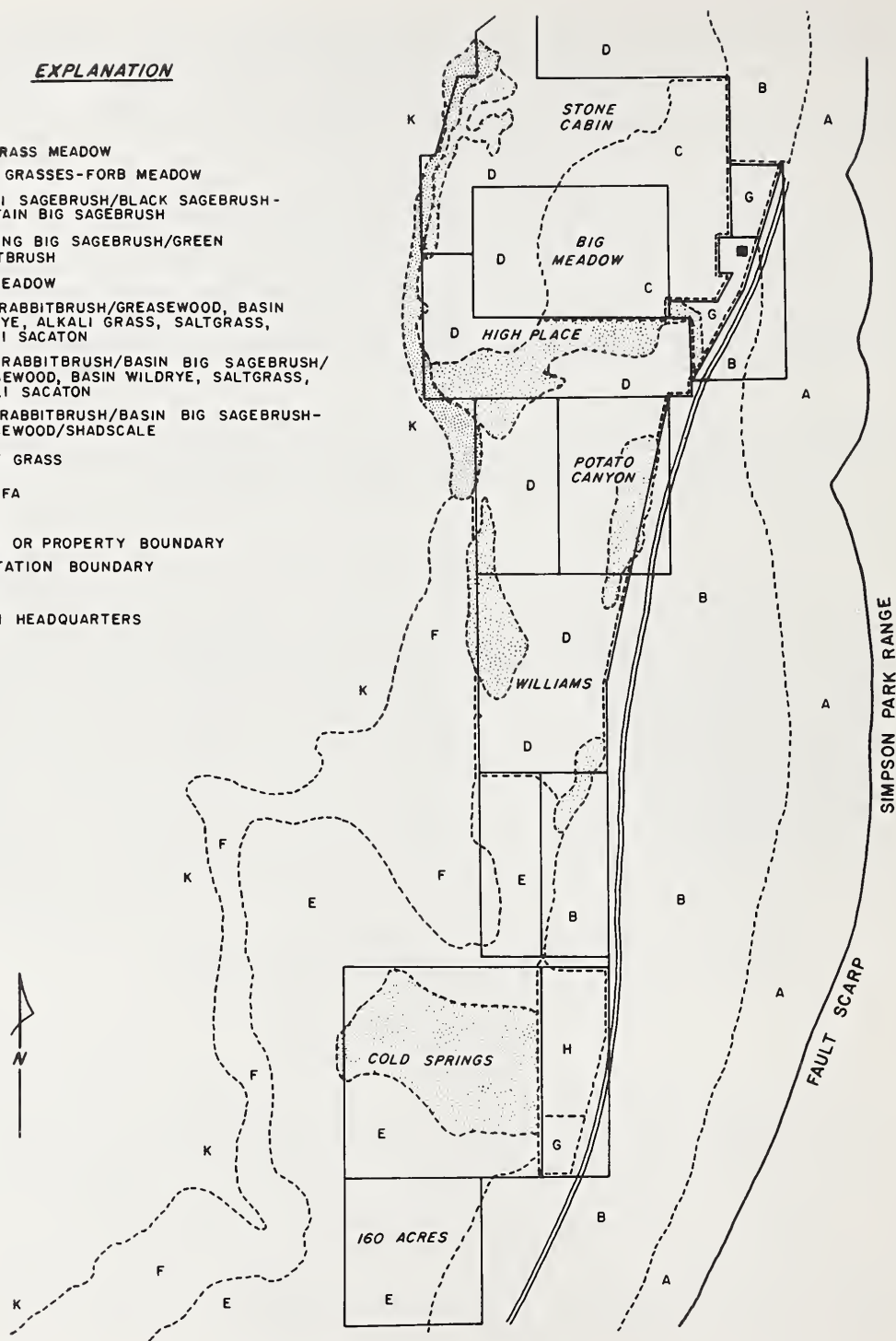


Figure 6.--Distribution of plant communities on Walti Unit of Gund Research and Demonstration Ranch.

further west of the mountains and has fewer springs, it is generally drier and slightly better drained than the northern half of the ranch. Soils here are generally saline and sodic throughout the soil profile because the seasonally high water table varies more than that on the northern part of the ranch. Meadows are on the southern half of the ranch at the base of the alluvial fans and along drainages to the west but not on the edge of the playa. This is because the distance between the playa and the mountains is so great that much of the drainage water is lost before it can accumulate at the edge of the playa. These differences in soil water and salt relations and those due to the depressions and ridges of the remnant low lake terraces of the lowlands result in highly variable plant communities over a small area.

In addition to irrigated hay meadows, large areas of natural meadows of various plant composition are on the deeded land. The main constituents of these meadows are saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), and Great Basin wildrye. The wettest meadows near the edge of the playa on the mesic northern half of the ranch and below the irrigated meadows are dominated by wiregrass (*Juncus balticus*) and saltgrass. Great Basin wildrye may be found in small to extensive patches in these meadows. The greatest area of meadows on the northern half of the ranch is dominated by alkali grass (*Puccinellia* spp.), alkali ivesia (*Ivesia kingii*), saltgrass, and alkali sacaton. Areas of high grass cover on these meadows may produce 1,000 lb of forage per acre (1120 kg/ha). Patches of visible surface salt accumulations are almost exclusively dominated by alkali grass and *Nitrophila occidentalis* and produce little forage. Other important forbs and grasses of the meadow communities include alkali cordgrass (*Spartina gracilis*), creeping wildrye (*Elymus triticoides*), saline plantain (*Plantago eriopoda*), arrowgrass (*Triglochin maritima*), Lemon's goldflower (*Hymenoxys lemmonii*), and hawksbeard (*Crepis runcinata* spp. *imbricata*).

The tolerance of saltgrass to flooding and salts is evidenced by the fact that saltgrass meadows extend beyond all other plant communities out onto the edge of the playa on the northern part of the ranch. To the south, the meadows are generally saturated for shorter periods and alkali grass is replaced in dominance by alkali sacaton and saltgrass. Great Basin wildrye is generally not present on these open meadows, which produce about the same quantities of forage as the high-condition alkali grass-dominated meadows to the north. Soils of these meadow communities are generally saline-sodic in the upper 6 to 10 inches (15 to 25 cm) of the profile and have a seasonally high water table to the surface in some areas and within 36 inches (91 cm) of the surface in other areas.

Large clones of Rocky Mountain iris (*Iris missouriensis*) are found in many of the meadow communities and indicate a history of heavy grazing. Another meadow plant community worthy of note is the Great Basin wildrye meadow below the irrigated alfalfa at the Allen ranch, north of the main deeded land. Except for a few understory weeds, this meadow is exclusively Great Basin wildrye, which produces about 2 tons of forage per acre (4.5 metric tons per hectare).

### Shrub-Dominated Communities

Three general shrub communities are found on the saline-alkaline lowlands at the Gund Research and Demonstration Ranch. Salt rabbitbrush (*Chrysothamnus nauseosus* spp. *consimilis*)/greasewood (*Sarcobatus vermiculatus*) communities are

found on the more mesic northern half of the ranch and in wetter, depressional areas to the south. Understory dominants to the north are alkali grass, saltgrass, alkali sacaton, and Great Basin wildrye. Also to the north, salt rabbitbrush may be replaced in small patches and on the edge of the meadows by the lower growing lance-leaf green rabbitbrush (*C. viscidiflorus* ssp. *lanceolatus*). Understory dominants of this salt rabbitbrush/greasewood plant community to the south are alkali sacaton, saltgrass, and Great Basin wildrye. Where this plant community is relatively ungrazed and receives tailwater from the Cold Springs alfalfa irrigation, Great Basin wildrye is much more abundant and salt rabbitbrush and greasewood Basin wildrye are much less abundant than in the same plant community elsewhere on the ranch. This suggests that some of the present salt rabbitbrush/greasewood-dominated communities were once Great Basin wildrye stands similar to the one at the Allen ranch.

Salt rabbitbrush and greasewood vary greatly in dominance in this community. Salt rabbitbrush tends to be dominant in poorly drained areas with a higher cover of understory grasses rather than in the somewhat better drained areas, where greasewood is dominant. Extensively to the south and in a few better drained areas to the north, basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) is a codominant with salt rabbitbrush in a salt rabbitbrush/basin big sagebrush/greasewood community. This community also is found in the silty lagoons behind the gravelly beach ridges at the lower edge of the alluvial fans. The understory is dominated by alkali sacaton in the wetter areas and by Great Basin wildrye and saltgrass in the drier areas. Squirreltail also is found in the understory of this community on the drier sites. Soils of these communities are silt loams and are saline-sodic in the upper 6 to 40 inches (15 to 100 cm) in some areas and throughout the soil profile in other areas. A seasonally high water table fluctuates from year to year but generally rises within 5 feet (1.5 m) of the soil surface.

Cover of Great Basin wildrye is much greater in this plant community under controlled grazing. On the southern end of the ranch, a drift fence historically served to push the livestock around the ranch and up to the Simpson Park Range for late spring and summer grazing. North of the fence, grazing was light while the drift area south of the fence was heavily grazed for many years. Some of this heavily grazed area was fenced and rested from grazing for 3 years. The lightly grazed pasture, the pasture heavily grazed then rested for 3 years, and the heavily grazed, unrested pasture have Great Basin wildrye frequency percentages of 43, 7, and 2, respectively. These data also indicate that Great Basin wildrye responds positively to grazing management after overuse.

A third lowland shrub-dominated community is the greasewood/shadscale (*Atriplex confertifolia*) community found on slightly higher and drier remnant low lake terraces or ridges. This community is found throughout the saline-alkaline lowlands of the Gund Research and Demonstration Ranch but covers a relatively small total area. The principal understory species is squirreltail, which is generally found only on the shrub mounds, where it is protected from grazing. Saltgrass and basin wildrye are also found in ecotones (transitional areas) with the other shrub communities. Soils of this community are silt loams and are moderately well drained but high in salt and sodium throughout the soil profile.



## Salt Desert Shrub Communities

Immediately adjacent to the ranch are a few shadscale communities typical of the salt desert shrub zone. In the south end of Grass Valley, several different types of salt desert shrub plant communities are present. These include budsage (*Artemisia spinescens*) and shadscale. These areas were extensively utilized by range sheep bands.

## Annotated List of Plants

The following is a list of plants that make up plant communities on the Gund Research and Demonstration Ranch deeded and transfer lands and on the near-by Simpson Park Range.

| <u>Family</u>  | <u>Scientific name</u>   | <u>Common name</u>     | <u>Location</u>                        |
|--|--|------------------------|--|
| Amaryllidaceae   | <u>Allium nevadense</u> Wats.  | Nevada onion           | Mountain slopes                        |
| Boraginaceae   | <u>Amsinckia tessellata</u> Gray                                       |                        | Alluvial fans                          |
|  | <u>Cryptantha flavoculata</u> (Nels.) Pays.                            | Yellow-eyed cryptantha | Alluvial fans                          |
|  | <u>Cryptantha torreyana</u> (Gray) Greene                              | Torrey's cryptantha    | Alluvial fans                          |
|  | <u>Lappula redowskii</u> (Hornem.) Greene                              | Stickseed              | Alluvial fans                          |
| Cactaceae  | <u>Opuntia polyacantha</u> Haw.  | Plains prickly-pear    | Alluvial fans                          |
| Capparidaceae  | <u>Cleomella plocasperma</u> Wats.                                     |                        | Saline-alkaline lowlands               |
| Caprifoliaceae   | <u>Sambucus caerulea</u> Raf.  | Blue elderberry        | Mountain streambanks                   |
|  | <u>Symphoricarpos vaccinoides</u> Rydb.                                | Mountain snowberry     | Mountain slopes                        |
| As the common name implies, this upland shrub has white to slightly pink berries and flowers. It is most abundant near the Gund R. & D. Ranch on north-facing slopes of the Simpson Park Range and has fair to good forage value for cattle and deer.  |  |                        |  |
| Caryophyllaceae  | <u>Arenaria kingii</u> (Wats.) Jones                                   | Sandwort               | Mountain slopes and ridges             |
|  | <u>Arenaria nuttallii</u> Pax. ssp. <u>fragilis</u> Maquire & Holmberg | Nuttall sandwort       | Mountain slopes                        |
| Chenopodiaceae   | <u>Allentolfea occidentalis</u> (Wats.) Kuntze                         | Iodine bush            | Saline-alkaline lowlands               |
| Iodine bush is a succulent shrub or half shrub with articulated green branches. This species is found on moist playas and is probably the most salt tolerant native vascular plant in the intermountain flora.   |  |                        |  |
|  | <u>Atriplex confertifolia</u> (Torr. & Frem.) Wats.                    | Shadscale              | Lowlake terraces and valley bottoms    |
| This species is a landscape-characterizing species of arid alkaline environments below the sagebrush zone in the Great Basin. An important component of sheep winter ranges, this compact, spiny shrub is palatable to all classes of livestock. It has succulent, oval leaves that are shed in autumn and used by livestock in winter. The seeds are the most palatable part of the plant and are nutritious as well. |  |                        |  |
|  | <u>Atriplex nuttallii</u> Wats.  | Nuttall Saltbush       | Saline-alkaline soils at edge of playa |
| Nuttall saltbush is a relatively small suffrutescent shrub with gray stems and leaves. This is a valuable browse species widely distributed on desert rangelands in the intermountain west. In central Nevada, Nuttall saltbush is often found at the margin of the playas.  |  |                        |  |
|  | <u>Atriplex truncata</u> (Torr.) Gray                                  | Wedgescale             | Saline-alkaline lowlands               |
| Wedgescale is an annual weed with scruffy gray branches and oval leaves. It tends to invade sprayed and seeded greasewood/salt rabbitbrush communities.  |  |                        |  |
|  | <u>Atriplex rosea</u> L.   | Red orache             | Disturbed areas                        |
|  | <u>Bassia hyssopifolia</u> (Pall.) Kuntze                              | Bassia or smotherweed  | Saline-alkaline meadows                |
|  | <u>Chenopodium album</u> L.  | Lambsquarters          | Disturbed areas                        |

| <u>Family</u>   | <u>Scientific name</u>                       | <u>Common name</u>          | <u>Location</u>                      |
|---|--|-----------------------------|--------------------------------------|
| Chenopodiaceae  | <u>Grayia spinosa</u> (Hook.) Mey.           | Hopsage                     | Alluvial fans                        |
| Hopsage is a deep gray-green shrub usually found on alkaline soils in the lower sagebrush or upper shadscale zones. Individual shrubs are often browsed by sheep or cattle, but dense patches of this shrub rarely show signs of intensive browsing. Branchlets and young twigs of hopsage are extremely brittle. The papery fruits of hopsage are picked up from the desert soil surfaces by sheep. Often in the autumn the leaves of hopsage turn bright red before they fall.  |  |                             |                                      |
|   | <u>Halogeton glomeratus</u> (Bieb.) C.A. Mey | Halogeton<br>or barilla     | Alluvial fans and<br>disturbed areas |
| Halogeton, a fleshy annual forb is a native of Eurasia. It was first reported in North America from collections made in Elko County in 1935. Since the 1930's, this poisonous species has spread throughout the northern Great Basin. Halogeton is generally found on saline-alkaline soils in the shadscale and lower sagebrush zones. Trailing hungry sheep through halogeton infestations has resulted in large death losses. Once halogeton becomes established, plant residues often enrich the soil surface layers with salts until no other plant can inhabit the area except this poisonous annual. |  |                             |                                      |
|   | <u>Kochia americana</u> Mats.                | Green-Molly, or<br>Red sage | Saline-alkaline lowlands             |
| This perennial species has many branching stems arising from a woody crown. Red sage is a browse plant on desert winter ranges. It is more abundant in western Utah than the salt deserts of Nevada. In central Nevada, this species occurs on the margin of playas.  |  |                             |                                      |
|   | <u>Monolepis nuttalliana</u> (Schult.) Green |                             | Great Basin<br>wildrye meadows       |
|   | <u>Nitrophilia occidentalis</u> (Nutt.) Moq. |                             | Saline-alkaline lowlands             |
| This short succulent perennial herb is found in the otherwise bare openings between greasewood plants on the most saline-alkaline soils.  |  |                             |                                      |
|   | <u>Salsola iberica</u> Sennen & Pau          | Russian thistle             | Disturbed areas                      |
| Russian thistle is an alien weed introduced from central Asia to western North America. A pest in grainfields, Russian thistle is found along roadsides throughout the Great Basin.   |  |                             |                                      |
|   | <u>Sarcobatus vermiculatus</u> (Hook.) Torr. | Greasewood                  | Saline-alkaline lowlands             |
| Greasewood is a large, robust shrub found in the valley bottoms. Because it often grows with roots in the fringe of saline-alkaline water, it produces vivid green leaves in an otherwise silver-gray landscape. Greasewood occurs extensively on the saline-alkaline lowlands in association with salt rabbitbrush in poorly drained areas and in association with shadscale or big sagebrush in somewhat better-drained areas. Its narrow, succulent leaves are toxic to livestock if eaten exclusively or in large quantities. The spiny   |  |                             |                                      |

| Family         | Scientific name  | Common name               | Location                                |
|----------------|--|---------------------------|---|
| Chenopodiaceae | <u>Sarcobatus vermiculatus</u> (con)   |                           |   |
|                | branchlets are also mechanically injurious to livestock. Trailing hungry sheep through dense areas of greasewood in the spring has resulted in large losses from oxalate poisoning. Control of the shrub for range improvement requires successive herbicide applications.   |                           |   |
| Compositae     | <u>Achillea lanulosa</u> Nutt.   | Yarrow                    | Upland meadows                          |
|                | Western yarrow is one of the most widely distributed and abundant herbaceous species on western ranges. Its forage value for livestock is fair, and it is eaten sparingly by mule deer. Abundance of yarrow on some high summer ranges indicates overuse, but its extensive underground rootstocks can be important for erosion control.   |                           |   |
|                | <u>Antennaria dimorpha</u> (Nutt) T. & G.  | Low pussytoes             | Alluvial fans                           |
|                | <u>Antennaria geyeri</u> Gray  | Pussytoes                 | Alluvial fans                           |
|                | <u>Antennaria luzuloides</u> T. & G.   | Pussytoes                 | Alluvial fans                           |
|                | <u>Artemisia arbuscula</u> Nutt.   | Low sagebrush             | Upper alluvial fans and mountain slopes |
|                | After big sagebrush, low sagebrush is the most abundant sagebrush in northern Nevada, accounting for roughly 5% of the vegetation. Low sagebrush usually occupies the oldest landforms in the sagebrush zone where the soil profile contains a well-developed clay horizon. Low sagebrush is also found on bald areas on the top of high, exposed ridges. As browse, low sagebrush is greatly preferred to basin and Wyoming big sagebrush by sheep and big game.  |                           |   |
|                | <u>Artemisia longiloba</u> (Osterhout) Beetle  | Alkali or early sagebrush | Upper alluvial fans and mountain slopes |
|                | The leaves and flower stalks of this species of sagebrush are preferred to big sagebrush by sheep. This dwarf sagebrush differs from other low sagebrush in its larger flower heads and early seed ripening (July and August). The flower parts give alkali sagebrush a tawny brown color, which characterizes the plant community.  |                           |   |
|                | <u>Artemisia nova</u> (A. Nels.)   | Black sagebrush           | Upper alluvial fans and mountain slopes |
|                | This low-growing sagebrush has an affinity for calcareous soil with a high amount of surface rock or pavement. At the Gund R. & D. Ranch, it is associated with low sagebrush on the upper alluvial fans and lower mountain slopes. Its flower stalks are persistent from the previous year, and its leaves may be either green and sticky or gray, like those of low sagebrush, in which case it is difficult to distinguish the two species in the field. Wildlife and sheep are generally thought to prefer black to low sagebrush. |                           |   |

| <u>Family</u> | <u>Scientific name</u>                | <u>Common name</u> | <u>Location</u>                  |
|---------------|---------------------------------------|--------------------|----------------------------------|
| Compositae    | <u>Artemisia spinescens</u> D.C. Eat. | Budsage            | Alluvial fans,<br>valley bottoms |

Budsage is the only woody species of sagebrush that grows abundantly in salt desert plant communities. In contrast to the other woody species of Artemisia, this spring bloomer is not a member of the tridentatae. Budsage is a valuable browse species especially for wintering sheep. This low shrub is the first shrub to begin growth in the spring on salt desert ranges.

|  |                       |               |
|--|-----------------------|---------------|
| <u>Artemisia tridentata</u> Nutt.<br>ssp. <u>tridentata</u>                  | Basin big sagebrush   | Lowlands      |
| <u>Artemisia tridentata</u> Nutt.<br>ssp. <u>wyomingensis</u> (Rydb.) Beetle | Wyoming big sagebrush | Alluvial fans |

Big sagebrush is the landscape-characterizing species of roughly 40% of the landscape in northern Nevada. It is an important component of most of the plant communities in which it is not the complete dominant. Basin big sagebrush is the tallest of the big sagebrushes (mature plants are more than 100 cm (40 inches) tall. It generally grows on deep, well-drained soils of valley bottoms and foothills. At the ranch, it is associated with greasewood and salt rabbitbrush on bottom lands with slightly saline soils. Wyoming big sagebrush is distinctly shorter than basin big sagebrush. It is found on the most arid portions of the sagebrush zone. Its occurrence at the Gund R. & D. Ranch on the lower portions of the alluvial fans indicates that soil is nonsaline and that the period of available moisture is shorter than on the slopes above and the valley bottoms below. Wyoming big sagebrush produces more lateral roots in the upper soil layers than other big sagebrush taxa and consequently tends to strongly compete for soil moisture with associated herbaceous species, even at characteristically low densities. The essential oil content of the herbage of basin and Wyoming big sagebrush limits their preference by browsing animals and inhibits the rumen microorganisms of range animals that consume large quantities of the browse of these subspecies. Mountain big sagebrush occupies higher elevation sites where soil moisture is available throughout most of the summer and at the Gund R. & D. Ranch extends from the upper portions of the alluvial fans up to the top of the Simpson Park Range on the deeper soils. It has a flat-topped appearance caused by the flower stalks all arising near the crown. In stands where the herbaceous vegetation has been disturbed it tends to increase in density and foliage cover, which may provide important mule deer fawning cover in some areas. Lower essential oil content of the herbage of this subspecies also results in considerably more browsing by big game animals.

| <u>Family</u> | <u>Scientific name</u>  | <u>Common name</u>       | <u>Location</u>                |
|---------------|---|--------------------------|--------------------------------|
| Compositae    | <u>Aster occidentalis</u> (Nutt.) Torr. & Gray  | Aster                    | Basin wildrye meadows          |
|               | <u>Balsamorhiza sagittata</u> (Pursh) Nutt.   | Arrowleaf balsamroot     | Mountain slopes                |
|               | Arrowleaf balsamroot is an important perennial herb with arrow-shaped leaves and yellow sunflowerlike flowers. It is grazed by livestock, deer, and elk; especially in the spring but also after the leaves dry up in middle or late summer.  |                          |                                |
|               | <u>Centaurea repens</u> L.  | Russian knapweed         | Cultivated and disturbed areas |
|               | This noxious weed is a serious pest on Nevada ranches. Spreading by underground stems, this weed is difficult to control.   |                          |                                |
|               | <u>Chaenactis douglasii</u> (Hook.) H. & A.   | False yarrow             | Alluvial fans                  |
|               | <u>Chrysothamnus albidus</u> (Jones) Greene   | White flower rabbitbrush | Saline/alkaline communities    |
|               | This species of rabbitbrush is unique because of its white flowers and habitat. A pronounced halophyte, white flower rabbitbrush is found growing on very saline/alkaline soils in greasewood and Great Basin wildrye communities. A low shrub 1 to 1 and 1/2 feet high with fine dark-green leaves, it is easy to overlook. This species is never abundant, but occurs widely in the intermountain west. Its greatest abundance is found on the margins of the Great Salt Lake.  |                          |                                |
|               | <u>Chrysothamnus viscidiflorus</u> (Hook.) Nutt. ssp. <u>viscidiflorus</u>  | Green rabbitbrush        | Alluvial fans                  |
|               | Green rabbitbrush is the most important subdominant shrub in big sagebrush communities. This subspecies of rabbitbrush is virtually never utilized by domestic livestock or big game. Green rabbitbrush crowns sprout after being burned, and the sprouts produce abundant achenes to reoccupy the site. Green rabbitbrush often dominates wildfire areas for 10 to 15 years before sagebrush reestablishes dominance. Careful timing is required to control this shrub with herbicides. Stems are rough and woody, contrasting with the smooth, green stems of salt rabbitbrush. |                          |                                |
|               | <u>Chrysothamnus nauseosus</u> (Pall.) Britt. ssp. <u>consimilis</u> (Green) Hall & Clem.   | Salt rabbitbrush         | Saline-alkaline lowland        |
|               | Commonly associated with greasewood in the wetter saline-alkaline lowlands, this distinctively large, green-colored rabbitbrush is not preferred by livestock. Its flowers are bright yellow and are arranged in elongated pyramids. This species sprouts after the top is removed by brush beating and is relatively difficult to control with herbicides.   |                          |                                |
|               | <u>Cirsium foliosum</u> (Hook.) D.C.  | Elk thistle              | Wet meadows                    |



| <u>Family</u> | <u>Scientific name</u>  | <u>Common name</u>      | <u>Location</u>          |
|---------------|---|-------------------------|--------------------------|
| Compositae    | <u>Cirsium vulgare</u> (Savi) Ten.  | Bull thistle            | Edge of wet meadows      |
|               | <u>Crepis acuminata</u> Nutt.   | Tapertip hawksbeard     | Alluvial fans            |
|               | This native perennial forb is a colorful addition to the sagebrush flora and provides a valuable addition to the diets of upland bird species.  |                         |                          |
|               | <u>Crepis runcinata</u> ssp. <u>imbricata</u><br>Babc. & Stebbins   | Hawksbeard              | Saline-alkaline lowlands |
|               | This is one of the more common forbs in and surrounding many lowland saline-alkaline meadows. It has slender stems, smooth leaves, and relatively few dandelionlike flowers.  |                         |                          |
|               | <u>Crepis modocensis</u> ssp. <u>modocensis</u><br>Greene.  | Hawksbeard              | Saline-alkaline lowlands |
|               | <u>Erigeron aphanactis</u> (Greene.) Gray   | Basin rayless daisy     | Alluvial fans            |
|               | <u>Erigeron bloomeri</u> Gray   | Bloomer's daisy         | Alluvial fans            |
|               | <u>Erigeron divergens</u> T. & G.   | Diffuse daisy           | Alluvial fans            |
|               | <u>Erigeron pumilus</u> Nutt.   | Hairy fleabane daisy    | Alluvial fans            |
|               | The wild daisies ( <u>Erigeron</u> spp.) have numerous small flowers in heads that have the appearance of a single flower. Center flowers are generally yellow, while the outer flowers are pink, blue, purple, or white. Wild daisies are generally poor forage.                 |                         |                          |
|               | <u>Eriophyllum lanatum</u> (Pursh) Forbes   | Common woody sunflower  | Alluvial fans            |
|               | <u>Haplopappus lanceolatus</u> (Hook.) T. & G.<br>var. <u>lanceolatus</u>   | Lanceleaf goldenweed    | Saline-alkaline lowlands |
|               | <u>Haplopappus uniflorus</u> (Hook.) T. & G.<br>var. <u>uniflorus</u>   | Goldenweed              | Saline-alkaline lowlands |
|               | <u>Helianthella uniflora</u> (Nutt.) T. & G.  | One flower Helianthella |                          |
|               | <u>Hymenoxys lemmonii</u> (Greene) Ck11.  | Lemmon's goldflower     | Saline-alkaline lowlands |
|               | This forb is poisonous throughout the growing season. Its golden-yellow flowers resemble asters.  |                         |                          |
|               | <u>Iva axillaris</u> Pursh  | Poverty weed            | Disturbed areas          |
|               | Although this species is a native plant, it often is considered to be a noxious weed. Spreading by underground stems, it is very difficult to control.  |                         |                          |
|               | <u>Lactuca serriola</u> L.  | Prickly lettuce         | Disturbed areas          |
|               | <u>Lygodesmia spinosa</u> Nutt.   | Skeleton-weed           | Alluvial fans            |
|               | Spiny skeletonweed is a spinescent, rigid, perennial forb, usually less than 40 cm (16 inches) tall. It is found in many vegetation types but in central Nevada is common in degraded sagebrush communities. The inconspicuous rose to pink flowers are born on spiny branchlets. |                         |                          |
|               | <u>Machaeranthera canescens</u> (Pursh) Gray  | Aster                   | Mountain slopes          |
|               | <u>Senecio integerrimus</u> Nutt. var.<br><u>exaltatus</u> (Nutt.) Cronq.   | Lambstongue groundsel   | Alluvial fans            |
|               | <u>Senecio multilobatus</u> T. & G.   | Basin butterweed        | Alluvial fans            |

| <u>Family</u>  | <u>Scientific name</u>  | <u>Common name</u>    | <u>Location</u>                |
|----------------|---|-----------------------|--------------------------------|
| Compositae     | <u>Solidago spectabilis</u> (D.C. Eat.) Gray  | Goldenrod             | Saline-alkaline lowlands       |
|                | <u>Taraxacum officinale</u> Wiggers   | Dandelion             | Basin wildrye meadows          |
|                | <u>Tetradymia canescens</u> D.C.  | Horsebrush            |                                |
|                | Horsebrush is a silver-gray leafed shrub that is subdominant in many big sagebrush communities. Horsebrush is a true root sprouter that sends up a prolific number of shoots after being burned in wildfires. Until big sagebrush reinvades burned areas, horsebrush and green rabbitbrush often dominate. Horsebrush consumption causes the bighead disease of sheep, a form of photosensitization. Sheep that have previously consumed black sagebrush are particularly susceptible to photosensitization by eating horsebrush. |                       |                                |
|                | <u>Tetradymia glabrata</u> Gray   | Horsebrush            | Alluvial fans                  |
|                | <u>Tetradymia spinosa</u> H. & A.   | Cotton-thorn          | Greasewood lowlake terraces    |
|                | <u>Townsendia scapigera</u> D.C. Eat.   | Ground-daisy          | Alluvial fans                  |
|                | <u>Wyethia mollis</u> Gray  | Woolly mulesear       | Mountain slopes                |
|                | This coarse forb with large, showy, daisylike flower heads is an important part of the sagebrush vegetation. The large, woolly leaves are responsible for the common name.  |                       |                                |
| Convolvulaceae | <u>Convolvulus arvensis</u> L.  | Bindweed              | Disturbed areas                |
|                | <u>Tragopogon dubius</u> Scop.  | Goatsbeard            | Disturbed areas                |
| Cornaceae      | <u>Cornus stolonifera</u> Michx.  | American dogwood      | Mountain stream banks          |
| Cruciferae     | <u>Arabis glabra</u> (L.) Bernh.  | Tower-mustard         | Alluvial fans                  |
|                | <u>Arabis holboellii</u> Hornem.  | Rock-cress            | Alluvial fans                  |
|                | <u>Arabis puberula</u> Nutt.  | Rock-cress            | Alluvial fans                  |
|                | <u>Camelina microcarpa</u> Andr. ex D.C.  | False-flax            | Alluvial fans                  |
|                | <u>Capsella bursa-pastoris</u> (L.) Medic.  | Shepherd's purse      | Basin wildrye meadows          |
|                | <u>Cardaria draba</u> (L.) Desv.  | Whitetop              | Cultivated and disturbed areas |
|                | This native of central Europe and western Asia is a serious perennial weed pest throughout much of northern Nevada. A member of the mustard family, this species spreads by creeping rootstocks and often dominates poorly managed hayfields and waste areas around irrigated fields. It also spreads by seed. In sagebrush rangelands, it is often found where hay was airdropped to cattle during the hard winter of 1952.  |                       |                                |
|                | <u>Cardaria pubescens</u> (C.A. Mey) Roll.  | Globe-podded whitetop | Cultivated and disturbed areas |
|                | <u>Caulanthus crassicaulis</u> (Torr.) Wats.  |                       | Alluvial fans                  |
|                | <u>Chorispora tenella</u> (Pall.) D.C.  | Chorispora            | Alluvial fans                  |
|                | <u>Descurainia pinnata</u> (Watt.) Britt.   | Tansy mustard         | Disturbed sagebrush areas      |



| <u>Family</u>  | <u>Scientific name</u>  | <u>Common name</u>              | <u>Location</u>   |
|--|---|---------------------------------|---|
| Cruciferae   | <u>Descurainia sophia</u> (L.) Webb<br>ex Prantl                      | Flix-weed                       | Basin wildrye meadows   |
|  | <u>Lepidium flavum</u> Torr.  | Pepper-grass                    | Saline-alkaline lowlands  |
|  | <u>Lepidium lasiocarpum</u> Nutt.                                     | Pepper-grass                    | Alluvial fans   |
|  | <u>Lepidium perfoliatum</u> L.  | Shield-cress or<br>Pepper-grass | Alluvial fans and<br>lowlands   |
| Pepper-grass is a common annual dry-land weed. It is commonly found in the ecotone or transition zone between the big sagebrush community and the greasewood salt-rabbitbrush community. Pepper-grass stems appear to pass through the center of the strongly clasping stem leaves.  |   |                                 |   |
|  | <u>Rorippa nasturtium-aquaticum</u> (L.)<br>Britt. & Rem.             | Water-cress                     | Mountain streams  |
|  | <u>Sisymbrium altissimum</u> L.                                       | Tumble mustard                  | Alluvial fans   |
| Tumble mustard is a native of central Asia that was accidentally introduced to the sagebrush ranges of Nevada. It is often the first species after Russian thistle to invade disturbed areas. After this annual forb's flowers and seed matures, the stems break off at the ground surface and tumble across the landscape, dispersing the seed. This weed is an alternate host for the leafhoppers that transmit the curly top virus. |   |                                 |   |
|  | <u>Stanleya pinnata</u> (Pursh) Britton<br>ssp. <u>pinnata</u>        | Prince's plume                  | Alluvial fans   |
| Prince's plume is a tall, herbaceous perennial in the mustard family. The yellow flowers are arranged in long, showy flower heads. Although it is a fairly reliable indicator of seleniferous soil, it generally does not accumulate high concentrations of the highly toxic selenium as do some locoweeds. It is seldom grazed.   |   |                                 |   |
|  | <u>Stephanomeria exigua</u> Nutt.                                     | Wire lettuce                    | Alluvial fans   |
|  | <u>Thlaspi arvense</u> L.   | Penny-cress                     | Basin wildrye meadows   |
|  | <u>Thelypodium sagittatum</u> (Nutt.) Endl.<br>ssp. <u>sagittatum</u> |                                 | Saline-alkaline lowland   |
|  | <u>Thelypodium flexuosum</u> Rob.                                     | Thelypod                        | Saline-alkaline lowland   |
| Cupressaceae   | <u>Juniperus scopularum</u> Sarg.                                     | Rocky Mountain juniper          | In Nevada restricted to<br>margin of saline-alkaline<br>areas in valley bottom. |

Other than Utah juniper, this is the only juniper native to eastern Nevada. A relatively rare ecotype of the species is found in the bottom of Spring Valley between the Snake and Schell Creek ranges in White Pine County.

Juniperus osteosperma (Torr.) Little Utah juniper Mountain slopes

Utah juniper with single leaf pinyon composes the pinyon/juniper woodlands of the intermountain area. Utah juniper is a small tree of variable form. Occasionally it will have a single trunk and a pyramidal crown. Often this tree has many stems and a rounded, bushlike appearance. The wood of Utah juniper was widely used as posts

| <u>Family</u> | <u>Scientific name</u>   | <u>Common name</u>             | <u>Location</u>                               |
|---------------|--|--------------------------------|---|
| Cupressaceae  | <u>Juniperus osteosperma</u> (con)   |                                |   |
|               | for fences and corrals on Nevada ranches. Having greater ecologic amplitude than single leaf pinyon, the Utah juniper is found farther north and at lower elevations. Utah juniper trees produce bluish wax-covered berries in the fall that are eaten by pinyon jays and other birds.   |                                |   |
| Cuscutaceae   | <u>Cuscuta occidentalis</u> Millsp.  | Dodder                         | Disturbed areas;<br>parasitic on poverty weed |
|               | The dodders are parasitic plants that attack virtually any broadleaf plant species.  |                                |   |
| Cyperaceae    | <u>Carex parryana</u> Dewey  | Sedge                          | Lowland meadows                               |
|               | This <u>Carex</u> was only known in Nevada at Monitor Valley until it was discovered at the Gund R. & D. Ranch in wet meadows below the Waltham Hot Springs.   |                                |   |
|               | <u>Eleocharis pauciflora</u> (Lightf.) Link  | Few flower spike rush          | Lowland meadows                               |
|               | <u>Fimbristylis spaldicea</u> (L.) Vahl.   | Sedge                          | Lowland meadows                               |
| Ephedraceae   | <u>Ephedra viridis</u> Cov.  | Mormon tea                     | Mountain slopes                               |
|               | Green ephedra is one of the most unusual shrubs in the sagebrush zone. This gymnosperm is a member of a very ancient group of plants related to the pines and other conifers. Green ephedra is usually not highly preferred as a browse species, although occasionally it will be utilized. The striking green color of ephedra is refreshing in the severe grayness of sagebrush landscape. Green ephedra sprouts from woody crowns after burning.  |                                |   |
| Equisetaceae  | <u>Equisetum laevigatum</u> A. Br.   | Horsetail                      | Lowland meadows                               |
| Gentianaceae  | <u>Centaurium exaltatum</u> (Griseb.)<br>W. Wight  | Centourium                     | Lowland meadows                               |
| Geraniaceae   | <u>Erodium cicutarium</u> (L.) L'Her   | Redstream filaree              | Alluvial fans                                 |
| Graminaeae    | <u>Agropyron cristatum</u> (L.) Gaertn.  | Fairway crested<br>wheatgrass  | Alluvial fans                                 |
|               | <u>Agropyron desertorum</u> (Fisch.) Schult<br>'Nordan'  | Standard crested<br>wheatgrass | Alluvial fans                                 |
|               | Fairway and standard crested wheatgrass are long-lived perennial bunchgrasses introduced from the sagebrush zone of central Asia. Their early growth, hardiness, high tolerance to early spring grazing (in comparison with native grasses) and adaptability to arid sites have encouraged the seeding of extensive areas to these wheatgrasses for cattle forage in Nevada. In addition to relieving detrimental early season grazing pressure on native bunchgrass ranges, these seedings may produce enough forage in 0.2 ha (half an acre) to equal what it takes 6 ha (15 acres) to produce on similar sites supporting degraded big sagebrush communities. |                                |   |
|               | <u>Agropyron elongatum</u> (Host)<br>Beauv. 'Jose'   | Tall wheatgrass                | Saline-alkaline lowlands                      |
|               | <u>Agropyron elongatum</u> (Host) Beauv.<br>'Platte'   | Tall wheatgrass                | Saline-alkaline lowlands                      |

| <u>Family</u> | <u>Scientific name</u>                               | <u>Common name</u>      | <u>Location</u>            |
|---------------|--|-------------------------|----------------------------|
| Graminaeae    | <u>Agropyron intermedium</u> (Host) Beauv.<br>'Oahe' | Intermediate wheatgrass | Saline-alkaline lowlands   |
|               | <u>Agropyron riparium</u> Scribn. & Sm.              | Streambank wheatgrass   | Ditches and lowland meadow |
|               | <u>Agropyron spicatum</u> (Pursh) Scribn. & Sm.      | Bluebunch wheatgrass    | Mountain slopes            |

This native wheatgrass differs from most wheatgrasses in its comparatively long, recurved seed awns. It is important throughout the sagebrush belt where it has not been over-grazed and replaced by cheatgrass. High year-round forage value and an ability to grow on drier sites make this wheatgrass one of the leading native western forages. It is found sparingly on the upper elevation slopes of the Simpson Park Range.

|   |                    |             |
|---|--------------------|-------------|
| <u>Agropyron trachycaulum</u> (Link) Malte<br>ex H.F. Lewis | Slender wheatgrass | Wet meadows |
|---|--------------------|-------------|

Slender wheatgrass is one of the most widely distributed and highly palatable of the native wheatgrasses. It occurs sparingly at the Gund R. & D. Ranch on the native wet meadows.

|  |             |                 |
|--|-------------|-----------------|
| <u>Bromus marginatus</u> Nees. ex Steud. | Big brome   | Mountain slopes |
| <u>Bromus tectorum</u> L.                | Downy brome | Alluvial fans   |

Downy brome is perhaps the best known of the alien plants that characterize big sagebrush/bunchgrass communities in the Great Basin that have been degraded by overgrazing. Although downy brome provides considerable forage in wetter years, its growing season is short, its production is low in dry years, and its flammability is high. Replacement with perennial grasses and forbs is usually desirable. This can be done by seeding perennial wheatgrasses in the fall or spring after burning degraded sagebrush communities or after treatment with herbicides and a 1-year fallow period.

|   |                    |                          |
|---|--------------------|--------------------------|
| <u>Distichlis spicata</u> (L.) Greenevar.<br><u>stricta</u> (Torr.) Scribn. | Interior saltgrass | Saline-alkaline lowlands |
|---|--------------------|--------------------------|

Saltgrass is a coarse-leafed rhizomatous grass that is resistant to grazing. Although considered unpalatable in some areas, this grass provides considerable forage in numerous lowland ranges with saline soils.

|  |                     |                          |
|--|---------------------|--------------------------|
| <u>Elymus cinereus</u> Scribn. & Merr. | Great Basin wildrye | Saline-alkaline lowlands |
|--|---------------------|--------------------------|

Great Basin wildrye is one of the largest native bunch grasses on the western range and is most likely the grass that early travelers in the Great Basin described as touching their stirrups as they crossed the desert valleys. It is one of the few species in the Lahontan Basin of northern Nevada that is found both on poorly

| <u>Family</u> | <u>Scientific name</u>  | <u>Common name</u> | <u>Location</u>                      |
|---------------|---|--------------------|--------------------------------------|
| Gramineae     | drained saline- alkaline lowlands and on well-drained upland sites. Important in presettlement times as a resource for seed-gathering Indians and as forage for the draft animals of travelers and explorers, it later became important to the ranch industry and was mowed for hay or used as winter and early spring forage. Because of its sensitivity to mowing and spring grazing, most of the once-abundant stands have long since been depleted. The depleted ranges at the Gund Ranch now occupied mainly by greasewood and salt rabbitbrush provide an opportunity for research on brush control and Great Basin wildrye revegetation. Some good-condition stands of this robust grass also exist at the Gund R. & D. Ranch, offering an opportunity for study of grazing management techniques for proper utilization of this valuable resource without depleting the stands. |                    |                                      |
|               | <u>Elymus triticoides</u> Buckl.  | Creeping wildrye   | Saline-alkaline meadows              |
|               | Creeping wildrye is a blue-green perennial grass with long rootstocks. It is a minor component of the native lowland meadows at the Gund R. & D. Ranch but is quite abundant elsewhere in Nevada, especially along the Humboldt River. It is frequently cut for hay, and its abundance of seed encouraged its use as meal by the Indians.   |                    |                                      |
|               | <u>Festuca idahoensis</u> Elmer   | Idaho fescue       | Mountain slopes                      |
|               | Idaho fescue is found in a wide range of habitats and plant communities in all the Western States. Its occurrence near the Gund R. & D. Ranch is limited to north-facing upland slopes of the Simpson Park Range. Because of its high palatability and good grazing resistance, it is one of the most important native forages where it is abundant. This fescue may be quite sensitive to burning.   |                    |                                      |
|               | <u>Hordeum jubatum</u> L.   | Foxtail barley     | Cultivated fields                    |
|               | <u>Hordeum leporinum</u> Link   |                    | Roadsides and disturbed areas        |
|               | <u>Hordeum pusillum</u> Nutt.   | Little barley      | Basin wildrye meadows                |
|               | <u>Melica bulbosa</u> Geyer ex Porter & Coult   | Oniongrass         | Mountain slopes                      |
|               | <u>Muhlenbergia richardsonis</u> (Trin.) Rydb.  | Mat muhly          | Saline-alkaline lowlands and meadows |
|               | Mat muhly is a low, sod-forming grass that is found in scattered patches. This species is readily grazed but is not sufficiently abundant to be of great importance. Its small seeds, bent stems, and slender, scaly rootstocks are an aid to identification.   |                    |                                      |
|               | <u>Oryzopsis hymenoides</u> (Roemer & Schultes) Ricker  | Indian ricegrass   | Alluvial fans                        |
|               | Although not abundant, this ubiquitous grass provides excellent forage and is one of the few native perennial grasses in the big sagebrush community on the alluvial fans at the Gund R. & D. Ranch. The seeds of this grass are collected by rodents, whose caching activities may be important in the natural establishment of this species.  |                    |                                      |

| <u>Family</u>  | <u>Scientific name</u>   | <u>Common name</u>        | <u>Location</u>                         |
|--|--|---------------------------|---|
| Gramineae  | <u>Panicum hirticaule</u> Presl.   | Witchgrass                | Saline/alkaline lowland                 |
|  | <u>Phragmites australis</u> (Car.) Trin.   | Common reed               | Saline/alkaline meadows                 |
|  | This tall, robust grass forms dense clumps around springs and in moist depressions in meadows. Widely distributed, this species is found in virtually all States except the southeastern United States. In the Great Basin, <u>Phragmites</u> is restricted to infrequent moist habitats. The place name "cane springs" usually indicates the occurrence of <u>Phragmites</u> . The stems were used for arrows by Great Basin Indians. |                           |   |
|  | <u>Poa fendleriana</u> (Stead.) Vasey  | Mutton grass              | Mountain slopes                         |
|  | <u>Poa nevadensis</u> Vasey ex Scribn.   | Nevada bluegrass          | Saline/alkaline lowlands                |
|  | <u>Poa pratensis</u> L.  | Kentucky bluegrass        | Wet meadows                             |
|  | <u>Poa sandbergii</u> Vasey  | Sandberg bluegrass        | Alluvial fans                           |
|  | This well-known perennial bluegrass is common to most sagebrush communities in Nevada. It has an early but short growing season and produces a comparatively small amount of forage. This species is one of the last native grasses to persist on degraded sagebrush rangelands.   |                           |   |
|  | <u>Puccinellia airoides</u> (Nutt.) Wats. and Coult.   | Nuttall alkali grass      | Saline/alkaline lowlands                |
|  | <u>Puccinellia lemmonii</u> (Vasey) Scribn.  | Lemmon's alkali grass     | Saline/alkaline lowlands                |
| These two salt-tolerant grasses resemble bluegrass. Lemmon's alkali grass has a closed panicle or flowerhead, and Nuttall alkali grass has an open panicle. Both are readily grazed but are comparatively low producers of herbage.  |  |                           |   |
|  | <u>Polypogon monspeliensis</u> (L.) Desf.  | Rabbit's foot grass       | Springs and ditches                     |
|  | <u>Sitanion hystrix</u> (Nutt.) J.G. Sm.   | Bottlebrush squirrel-tail | Alluvial fans, saline/alkaline lowlands |
|  | Squirreltail is somewhat unusual in its ability to grow in nonalkaline big sagebrush communities and also on the saline-alkaline lowlands. Bottlebrush squirrel-tail and Sandberg bluegrass are native bunch grasses common on overgrazed ranges where the dominant native perennial grasses have been removed by overgrazing.   |                           |   |
|  | <u>Spartina gracilis</u> Trin.   | Alkali cordgrass          | Saline-alkaline lowlands                |
| This grass is found in scattered clones in and surrounding lowland meadows. It has thick rhizomes and a distinctive seed head with all the seeds on the one side of the flower stalk. This species may be a relic of the flora that surrounded the pluvial lakes of northern Nevada. |  |                           |   |



| <u>Family</u>   | <u>Scientific name</u>  | <u>Common name</u>      | <u>Location</u>         |
|-----------------|---|-------------------------|-------------------------|
| Gramineae       | <u>Sporobolus airoides</u> (Torr.) Torr.  | Alkali sacaton          | Saline-alkaline meadows |
|                 | This bunchgrass has deep, coarse roots and produces an abundance of tiny seeds in an open, pyramidal panicle. It is resistant to grazing and provides complete ground cover in the wetter saline-alkaline lowlands. Alkali sacaton often forms circular tussocks 0.9 m (1 yard) or more in diameter.  |                         |                         |
|                 | <u>Stipa columbiana</u> Macoun  | Columbian needlegrass   | Alluvial fans           |
|                 | <u>Stipa comata</u> Trin. & Rupr.   | Needle-and-thread grass | Alluvial fans           |
|                 | Named for its long, twisted and tapering seed bristle or awn, this is an early season bunchgrass. Its importance as forage at the Gund R. & D. Ranch is minimal because it is not abundant. In many areas, this species is the dominant native grass on sandy soils.  |                         |                         |
|                 | <u>Stipa lettermanii</u> Vasey  | Letterman's needlegrass | Mountain slopes         |
|                 | <u>Stipa nevadensis</u> B.L. Johnson  | Nevada needlegrass      | Mountain slopes         |
|                 | <u>Stipa thurberiana</u> Piper  | Thurber needlegrass     | Mountain slopes         |
|                 | This highly palatable, drought-tolerant needlegrass probably was an important component of many big sagebrush communities, including those on the alluvial fans at the Gund R. & D. Ranch. Because of its sensitivity to grazing, its occurrence in many areas has been reduced to slopes distant from water and other highly grazed areas.   |                         |                         |
|                 | <u>Vulpia octoflora</u> (Walt.) Rydb.   | Six-weeks fescue        | Alluvial fans           |
| Hydrophyllaceae | Six-weeks fescue is an ephemeral spring-annual grass. It may be quite abundant in wet years but absent in dry years on sagebrush ranges.  |                         |                         |
|                 | <u>Hesperochiron californicus</u> (Benth.) Wats.  | Hesperochiron           | Saline/alkaline meadows |
|                 | <u>Phacelia hastata</u> Dougl. ex Lehm ssp. <u>hastata</u>  | Silverleaf phacelia     | Mountain slopes         |
| Iridaceae       | <u>Iris missouriensis</u> Nutt.   | Rocky Mountain iris     | Wet meadows             |
|                 | This native perennial iris has large, attractive blue flowers and is found in patches throughout the wet meadows at the Gund Ranch. It is worthless as a forage plant and indicates overgrazing when increasing in stand density. Klamath Indian medicine men reportedly mixed rootstocks of iris with bulbs of meadow death camas and tobacco for their patients to smoke. The resulting nausea required a heavy fee to make the sick person well again. |                         |                         |
|                 | <u>Sisyrinchium halophilum</u> Greene   | Alkali blue-eyed grass  | Saline/alkaline meadows |
|                 | This species is a small native iris with basal, grasslike leaves and small, pale-blue flowers with a little yellow "eye." It is grazed by cattle but provides little forage.  |                         |                         |

| <u>Family</u> | <u>Scientific name</u>   | <u>Common name</u>        | <u>Location</u>         |
|---------------|--|---------------------------|-------------------------|
| Juncaginaceae | <u>Juncus balticus</u> Willd   | Wiregrass                 | Wet meadows             |
|               | Wiregrass is a rush, not a grass. It occurs extensively intermingled with sedges and grasses on the wetter areas of the natural lowland meadows and on or below the irrigated meadows. Mowed for hay, it cures well and is more palatable when cut green than when alive and growing in a pasture. It has high nutritive value. It is a characteristic species of native hay meadows in Nevada and is found throughout temperate and subarctic North America, northern Europe, and Asia. |                           |                         |
|               | <u>Juncus bufonius</u> L.  | Toadrush                  | Lowland meadows         |
|               | <u>Juncus longistylis</u> Torr.  |                           | Lowland meadows         |
|               | <u>Triglochin maritima</u> L.  | Arrowgrass                | Saline/alkaline meadows |
|               | Like wiregrass, arrowgrass is not really a grass. Arrowgrass is dangerous at all times because it contains hydrocyanic acid, a powerful respiratory poison. It becomes more toxic to livestock when its growth is stunted from lack of moisture or early frost. Its half-rounded, grasslike leaves grow from the base of the plant. This species can still be toxic when cut and cured for hay.  |                           |                         |
| Labiatae      | <u>Scutellaria antirrhinoides</u> Benth.   | Skullcap                  | Alluvial fans           |
| Leguminosae   | <u>Astragalus iodanthus</u> Wats.  | Humboldt River Milk vetch | Alluvial fans           |
|               | <u>Astragalus lentiginosus</u> Dougl.  | Milk vetch                | Alluvial fans           |
|               | <u>Astragalus newberryi</u> Gray   | Milk vetch                | Alluvial fans           |
|               | <u>Astragalus oophorus</u> Wats.<br>var. <u>oophorus</u>   | Milk vetch                | Mountain slopes         |
|               | <u>Astragalus purshii</u> Dougl.   | Wooly pod                 | Alluvial fans           |
|               | <u>Lupinus arbustus</u> Dougl. ssp. <u>calcaratus</u> (Kell.) D. Dunn  | Douglas' spurred lupine   | Alluvial fans           |
|               | <u>Lupinus brevicaulis</u> Wats.   | Short stem lupine         | Alluvial fans           |
|               | <u>Lupinus caudatus</u> Kell.  | Tailcup lupine            | Alluvial fans           |

Tailcup lupine is one of the perennial poisonous lupines. Since it is preferred by livestock and can be locally abundant, it is especially dangerous. Lupine pods and seeds retain their toxicity after the plants have matured, resulting in heavy losses of sheep trailed through lupine ranges in late summer. This lupine can be recognized by its dense silky-hairy leaflets.

| <u>Family</u>   | <u>Scientific name</u>   | <u>Common name</u>        | <u>Location</u>          |
|---|--|---------------------------|--------------------------|
| Leguminosae   | <u>Melilotus indica</u> (L.) All.  | Sweet clover              | Basin wildrye meadows    |
|   | <u>Medicago sativa</u> L.  | Alfalfa                   | Cultivated fields        |
|   | <u>Thermopsis montana</u> Nutt. var. <u>montana</u>  | Mountain thermopsis       | Meadow                   |
| Liliaceae   | <u>Calochortus nuttallii</u> Torr.   | Sego-lily                 | Alluvial fans            |
|   | The large, attractive flowers of this lily are among the most distinctive in the sagebrush/grasslands.   |                           |                          |
|   | <u>Zigadenus venenosus</u> Wats. var. <u>venenosus</u>   | Meadow death camas        | Alluvial fans            |
| Death camas has grasslike leaves sprouting from a deeply buried bulb. Animals may be poisoned by the toxic alkaloids in the leaves, stems, and flowers. Bulbs may cause severe illnesses in man. A perennial, death camas is one of the first plants to green up in early spring and may be used heavily if no other forage is available. |  |                           |                          |
| Linaceae  | <u>Linum perenne</u> L.  | Flax                      | Saline/alkaline lowlands |
| Loasaceae   | <u>Mentzelia laevicaulis</u> (Dougl.) T. & G.  | Blazing-star              | Alluvial fans roadsides  |
|   | This is the species for which the journal of the Northern Nevada Native Plant Society derives its name. This species has beautiful golden yellow flowers in late summer. |                           |                          |
| Malvaceae   | <u>Malva parviflora</u> L.   | Cheeseweed                | Disturbed areas          |
|   | <u>Sidalcea oregana</u> (Nutt.) Gray var. <u>oregana</u>   | Oregon checker mallow     | Lowland meadows          |
|   | <u>Sphaeralcea ambigua</u> Gray  | Desert globemallow        | Alluvial fans            |
|   | <u>Sphaeralcea grossulariaefolia</u> (H. & A.) Rydb.   | Globemallow               | Alluvial fans            |
| Najadaceae  | <u>Najas marina</u> L.   | Water-nymph               | Lowland meadows          |
| Onagraceae  | <u>Camissonia boothii</u> (Dougl. in Hook.) Raven ssp. <u>intermedia</u> (Munz) Raven  | Booth's primrose          | Roadside                 |
|   | <u>Camissonia claviformis</u> (Torr. & Frem.) Raven ssp. <u>integrifolia</u> Raven   | Clavate-fruited           | Mountain slopes          |
|   | <u>Gayophytum heterozygum</u> Lewis & Szweykowski  | Groundsmoke               | Alluvial fans            |
|   | <u>Gayophytum ramosissimum</u> T. & G.   | Groundsmoke               | Alluvial fans            |
|   | <u>Oenothera caespitosa</u> Nutt. var. <u>marginata</u> Hook.  | Tufted evening primrose   | Mountain slopes          |
|   | <u>Oenothera hookeri</u> T. & G. ssp. <u>angustifolia</u> (Gates) Munz   | Hooker's evening primrose | Alluvial fans            |

| <u>Family</u>  | <u>Scientific name</u>   | <u>Common name</u>   | <u>Location</u>                           |
|--|--|----------------------|---|
| Papaveraceae   | <u>Argemone munita</u> Dur. & Hilg.  | Prickly poppy        | Alluvial fans<br>Roadsides                |
| With large white flowers, prickly poppy is the distinctive species of roadsides in the sagebrush/grasslands of central Nevada.   |  |                      |   |
| Pinaceae   | <u>Pinus monophylla</u> Torr. & Frem.  | Single-leaf pinyon   | Mountain slopes                           |
| With Utah juniper, single-leaf pinyon forms the pinyon/juniper woodlands of the Great Basin. A relatively small, multibranched tree, single-leaf pinyon, along with juniper, the only source of wood for mines and ranchers in central Nevada. The pinenuts produced by this species were important in the diet of Great Basin Indians. The pinyon/juniper woodlands are important in the ecology of mule deer. The pinyon/juniper woodlands provide habitat for a large number of bird species at the Gund R. & D. Ranch. |  |                      |   |
| Plantaginaceae   | <u>Plantago eriopoda</u> Torr.   | Saline plantain      | Saline-alkaline lowlands and meadows      |
| Polemoniaceae  | <u>Collomia linearis</u> Nutt.   | Slenderleaf collomia | Alluvial fans                             |
|  | <u>Gilia inconspicua</u> (Sm.) Sweet   | Shy Gilia            | Alluvial fans                             |
|  | <u>Gilia triodon</u> Eastw.  | Gilia                | Roadsides                                 |
|  | <u>Leptodactylon pungens</u> (Torr.) Rydb. ssp. <u>pulchriflorum</u> (Brand) Mason | Prickly phlox        | Alluvial fans                             |
|  | <u>Microsteris gracilis</u> (Hook.) Greene   | Micrantha            | Alluvial fans                             |
|  | <u>Navaretia breweri</u> (Gray) Greene   | Brewer's gilia       | Alluvial fans                             |
|  | <u>Phlox austromontana</u> Cov.  | Desert phlox         | Alluvial fans                             |
|  | <u>Phylox longifolia</u> Nutt.   | Wild phlox           | Mountain slopes                           |
|  | <u>Phylox stansburyi</u> (Torr.) Heller  | Phlox                | Alluvial fans                             |
| Polygonaceae   | <u>Eriogonum elatum</u> Dougl. ex Benth var. <u>elatum</u>                         | Rush eriogonum       | Mountain slopes                           |
|  | <u>Eriogonum heermanii</u> Dur. & Hilg.  | Heerman's eriogonum  | Mountain slopes                           |
|  | <u>Eriogonum ovalifolium</u> Nutt. var. <u>ovalifolium</u>                         | Oval leaf eriogonum  | Alluvial fans                             |
|  | <u>Eriogonum umbellatum</u> Torr.  | Sulfur flower        | Mountain slopes                           |
| The eriogonums or wild buckwheats are annuals, herbaceous perennials, or half-shrubs to fullshrubs. They are widely distributed on western ranges. These plants may have one to many generally leafless flower stems, and their leaves are usually basal and rounded, elliptical, or spatula-shaped. Most eriogonums are seldom grazed, although the flower heads are sometimes eaten. Sulfur flower eriogonum is a highly preferred plant by mule deer and has great potential as an ornamental species.                  |  |                      |   |
|  | <u>Polygonum aviculare</u> L.  | Prostrate knotweed   | Disturbed areas and basin wildrye meadows |

| <u>Family</u>  | <u>Scientific name</u>   | <u>Common name</u>            | <u>Location</u>                         |
|--|--|-------------------------------|---|
| Polygonaceae   | <u>Polygonum sawatchense</u>   | Knotweed                      | Basin wildrye meadows                   |
|  | <u>Rumex</u> sp.   | Dock                          | Mountain streambank                     |
| Primulaceae  | <u>Dodecatheon pulchellum</u> (Raf.) Merr.   | Shooting star                 | Saline-alkaline meadows                 |
| Ranunculaceae  | <u>Aquilegia formosa</u> Fisch. in D.C.<br>var. <u>formosa</u>   | Sitka columbine               | Mountain streambank                     |
|  | <u>Aquilegia shockleyi</u> Eastw.  | Columbine                     | Mountain streambank                     |
| <p>The columbines are some of the most beautiful native western range plants. Their unusual shaped red and yellow flowers with many spurs have been likened to a circle of doves on a perch or the back of a jet engine. As forage plants, the columbines are of minor importance.</p> |  |                               |   |
|  | <u>Delphinium andersonii</u> Gray  | Larkspur                      | Alluvial fans                           |
|  | <p>Larkspur has attractive, easily recognized blue flowers with a characteristic spur. The alkaloids in larkspur are highly toxic to cattle. Cattle losses are especially likely in early spring before larkspur flowers.</p>  |                               |   |
|  | <u>Glaux maritima</u> L.   | Sea-milkwort                  | Lowland meadows                         |
|  | <u>Ranunculus cymbalaria</u> Pursh<br>var. <u>saximontanus</u> Fern  | Rocky Mountain<br>buttercup   | Wet Meadow                              |
|  | <u>Ranunculus testiculatus</u> Crantz  | Buttercup                     | Alluvial fans                           |
|  | <u>Amelanchier utahensis</u>   | Serviceberry                  | Mountain slopes                         |
| Rosaceae   | <p>Serviceberry is a large shrub or small tree found growing in higher elevation sagebrush sites. A member of the Rose family, serviceberry is considered a valuable browse species.</p>   |                               |   |
|  | <u>Cercocarpus ledifolius</u> Nutt.  | Curlleaf mountain<br>mahogany | Mountain slopes                         |
|  | <p>Mountain mahogany is distributed sparingly on the upper slopes of the Simpson Park Range. It has narrow, leather leaves that are rolled under and persist until the end of the second summer. The stout, spreading branches and short trunk generally form a large shrub or a small tree. It is an important winter browse for mule deer.</p> |                               |   |
|  | <u>Cowania mexicana</u> var. <u>stansburiana</u><br>(Torr.)  | Stansbury's cliffrose         | Mountain slopes                         |
|  | <p>Closely related to bitterbrush, cliffrose is a valuable browse species in the southern Great Basin.</p>   |                               |   |
|  | <u>Holodiscus sumosus</u> (Hook.) Heller<br>var. <u>glabrescens</u> (Greenm.) C.L.<br>Hitchc.  | Bushrock spiraea              | Lowland meadows                         |
|  | <u>Ivesia kingii</u> Wats.   | Alkali ivesia                 | Saline-alkaline lowlands<br>and meadows |
| <p>This salt-tolerant herb has long, vinelike stems crowded with small, saucer-shaped leaves. Flowers are small and white. It is most abundant on heavily grazed saline-alkaline native meadows.</p>   |  |                               |   |



| <u>Family</u> | <u>Scientific name</u>                 | <u>Common name</u>     | <u>Location</u>                                     |
|---------------|--|------------------------|---|
| Rosaceae      | <u>Potentilla anserina</u>             | Common silver-weed     | Lowland meadows                                     |
|               | <u>Potentilla biennis</u> Greene       | Biennial cinquefoil    | Mountain stream banks and alluvial fan stream banks |
|               | <u>Potentilla pectinisecta</u> Rybd.   | Cinquefoil             | Basin wildrye meadows                               |
|               | <u>Prunus virginiana</u> L.            | Western chokecherry    | Mountain stream banks                               |
|               | <u>Purshia tridentata</u> (Pursh) D.C. | Antelope bitterbrush   | Mountain slopes                                     |
| Rubiaceae     | <u>Rosa woodsii</u> Lindl.             | Wood's rose            | Mountain stream banks                               |
|               | <u>Galium aparine</u> L.               | Bedstraw               | Mountain slopes                                     |
| Salicaceae    | <u>Populus alba</u> L.                 | White or silver poplar | High place  |

Although bitterbrush is rare near the Gund R. & D. Ranch, it is one of the most important browse plants on western ranges. Bitterbrush leaders are high quality browse and are grazed by cattle and sheep. On many spring and winter ranges, bitterbrush is the key browse plant for deer, elk, and antelope.

A medium-sized tree 40 to 60 feet high. This species is easily identified because of its contrast in color of leaf surfaces. The upper surface is dark green and glabrous, while the under surface is very white-tomentose. A native of Europe and Asia, white poplar was planted around many ranch headquarters in Nevada.

|   |                    |                    |
|---|--------------------|--------------------|
| <u>Populus deltoides</u> Bartr. ex Marsh. | Eastern cottonwood | Ranch headquarters |
| <u>Populus fremontii</u> Wats.            | Fremont cottonwood | Ranch headquarters |

The Fremont cottonwood is confined to the margins of streams and alluvial soils in flood plains along perennial streams. Cottonwood trees often occur around ranch headquarters in Nevada where they were intentionally planted or rooted from green cottonwood post. Fremont cottonwood occurs as a native along the Carson, Truckee, Walker, and upper Reese Rivers. Ordinarily this species reaches heights of 50 to 75 feet.

|  |                 |                    |
|--|-----------------|--------------------|
| <u>Populus nigra</u> L. var. <u>italica</u> Muenchh. | Lombardy poplar | Ranch headquarters |
|--|-----------------|--------------------|

This rapid growing, single stemmed poplar was planted around many early day ranch headquarters in Nevada. A relatively short-lived tree, many abandoned ranch or homestead locations are marked by whitened skeletons of this species.

| <u>Family</u>    | <u>Scientific name</u>  | <u>Common name</u>      | <u>Location</u>                 |
|------------------|---|-------------------------|---------------------------------|
| Salicaceae       | <u>Populus tremuloides</u>  | Quaking aspen           | Canyon bottoms                  |
|                  | <p>Found mainly in moist spots on the higher mountain ranges of central Nevada, the quaking aspen is one of the few broad leaf trees native to the area. Aspen groves vary from a few square feet to several acres in size. Many may represent a single clone. With graceful, white-barked trunks and trembling leaves the aspen provides shade in a generally treeless environment. In autumn, the gold and scarlet leaves color an otherwise gray landscape. Quaking aspen groves are an important part of mule deer habitat.</p> |                         |                                 |
|                  | <u>Populus trichocarpa</u> T. & G.  | Black cottonwood        | Planted at headquarters         |
|                  | <p>Like Fremont's cottonwood, this native tree has been widely planted around ranch headquarters in Nevada. Native to the mountains of the Pacific northwest, the northern Rockies, and the Sierra Nevada, the black cottonwood also occurred in the high mountains of central and eastern Nevada. Black cottonwood is the largest of the native cottonwoods reaching heights of 125 feet.</p>  |                         |                                 |
|                  | <u>Salix</u> spp.   | Willow                  | Ranch fields and canyon bottoms |
| Scrophulariaceae | <u>Castilleja chromosa</u> A. Nels.   | Early Indian paintbrush | Alluvial fans                   |
|                  | <p>The brilliant red bracts surrounding the blossoms of this plant make it one of the most colorful of the paintbrushes. These herbs can grow independently but are usually parasitic on the roots of other plants. The paintbrushes are generally not abundant, but some species are palatable to livestock, deer, and elk. The roots of paintbrush were used by the Indians in making black dye for buckskin.</p>   |                         |                                 |
|                  | <u>Castilleja exilis</u> A. Nels.   | Paintbrush              | Lowland meadows.                |
|                  | <u>Collinsia parviflora</u> Dougl. ex Lindl.  | Little flower collinsia | Alluvial fans                   |
|                  | <u>Cordylanthus ramosus</u> Nutt. ex Benth  | Bird's-beak             | Basin wildrye meadows           |
|                  | <u>Mimulus guttatus</u> Fisch. ex D.C.  | Common monkey flower    | Alluvial fans                   |
|                  | <p>This attractive herb is named for the resemblance of its irregular, two-lipped flowers to the masks worn by mimes, or comic actors, on the ancient stage. The flowers of this particular species are yellow with dots of purple or brown inside, and the leaves are irregularly toothed. Grazed only lightly by livestock and wildlife, the succulent herbage was once eaten by early settlers as a salad.</p>   |                         |                                 |

| <u>Family</u>    | <u>Scientific name</u>                         | <u>Common name</u> | <u>Location</u>      |
|------------------|--|--------------------|----------------------|
| Scrophulariaceae | <u>Mimulus densus</u> Grant.                   | Monkey flower      | Alluvial fans        |
|                  | <u>Mimulus suksdorfii</u> Gray                 | Monkey flower      | Alluvial fans        |
|                  | <u>Penstemon speciosus</u> Dougl.<br>ex Lindl. | Beard-tongue       | Alluvial fans        |
|                  | <u>Scrophularia desertorum</u> (Munz)<br>Shaw  | Figwort            | Mountain streambanks |
| Solanaceae       | <u>Lycium barbarum</u> L.                      | Box-thorn          | Alluvial soils       |
|                  | <u>Lycium torreyi</u> Gray                     | Box-thorn          | Alluvial soils       |
| Tamaricaceae     | <u>Tamarix ramosissima</u> Ledeb.              | Salt cedar         | Saline/alkaline      |

This native to central Asia has become naturalized along streams and saline sinks in western North America. Extensive stands are found near Walker Lake and the Humboldt Sink below Lovelock.

|               |   |                   |                      |
|---------------|---|-------------------|----------------------|
| Umbelliferae  | <u>Berula erecta</u> (Huds.) Co.                      | Water-parsnip     | Lowland meadows      |
|               | <u>Cymopterus corrugatus</u> Jones                    | Chimaya           | Alluvial fans        |
|               | <u>Cymopterus ibepenis</u> Jones                      | Chimaya           | Alluvial fans        |
|               | <u>Perideridia bolanderi</u> (Gray)<br>Nels. & Macbr. | Bolander's yambah | Alluvial fans        |
| Urticaceae    | <u>Urtica holosericea</u> Nutt.                       | Hoary nettle      | Mountain streambanks |
| Valerianaceae | <u>Plectritis macrocera</u> T. & G.                   | White plectritis  | Mountain streambanks |

## WILDLIFE

Wildlife populations have changed dramatically since the first ranch was established in the area. Although we know little about nongame species, game populations now are quite different than those of 80 years ago. According to natives of the area, antelope were common in the valley at the turn of the century, bighorn sheep (probably *Ovis canadensis nelsoni*) were still present in the Simpson Park Range, and mule deer (*Odocoileus hemionus*) were almost nonexistent. At present, antelope (*Antilocapra americana*) and bighorns are not known to occur in this area, whereas deer are common. These changes parallel those that apparently occurred in Nevada as a whole. Early explorers actually found some game scarce in Nevada. Jedediah Strong Smith, who passed through central Nevada on a return route from California, found the country "completely barren and destitute of game" (Anonymous, 1964). He and his party were forced to eat most of their horses. Recording for the Walker party of 1833, Zenas Leonard wrote that the country was "almost without game except for some bighorn sheep, some antelope and rabbits" (Anonymous, 1964). Apparently, although antelope and bighorn sheep were formerly more numerous than they are at present (statewide), they never were really abundant. The decline of antelope in the State has been blamed on uncontrolled hunting, habitat reduction, construction of fences, and susceptibility to disease (Yoakum, 1968). Likewise, bighorn sheep were also overhunted, and overgrazing by livestock resulted in range reduction, but scabies, apparently contracted from domestic sheep, may have contributed the most to the bighorn sheep's decline (Buechner, 1960).

Although overgrazing may have contributed to the decline in antelope and sheep, the habitat shift resulted in improved deer range. In the sagebrush/bunchgrass type, heavy grazing brought about a decline in grasses and an increase in shrubs (Stoddart, 1941; Urness, 1976). Mule deer, being primarily browsers, have increased accordingly. From a time at the turn of the century when deer were so rare that sightings made headlines, deer had increased by the 1930's in the Austin area to the point that area residents claimed that 500 to 1,000 deer could be seen in Kingston Canyon on a typical summer evening (Anonymous, 1964). Deer populations probably peaked in Nevada in the 1950's. By the 1960's, deer populations were declining in Nevada and the West in general (Urness, 1976), but recent indications are that mule deer populations are in another upward trend. Residents of the Gund Ranch area report an increase during the last 5 years.

Compared with their presettlement levels, sage grouse (*Centrocercus urophasianus*) populations at the Gund Ranch are low. The depletion of grasses and forbs from sagebrush understories by turn-of-the-century overgrazing has undoubtedly had an impact. Grouse populations have probably been affected by meadow deterioration as well. Habitat diversity within the sagebrush environment is necessary to provide for all the needs of the sage grouse (Klebenow, 1972).

When settlers first came to Grass Valley, Hungarian partridges (*Perdix perdix*) and chukars (*Alectoris chukar*) were not present. These two birds were first introduced in the State in the 1920's and 1930's, respectively. Since then, chukars have become well established and are now Nevada's number one game bird (Molini, 1976). The early introduction of downy brome has paved the way for the successful establishment of this Asian exotic. Overgrazing permitted the invasion of downy brome under shrubs as replacement for the weakened native perennials.

Changes in small mammal populations in the Gund Research and Demonstration Ranch area are not well documented; however, at least one major change has occurred since the turn of the century. White-tailed jackrabbits (*Lepus townsendii*), reportedly common in the vicinity during early ranching days, have all but vanished. Not one was sighted during our wildlife inventory. Black-tailed jackrabbits (*Lepus californicus*), however, are abundant. The spread of black-tails into areas formerly occupied by white-tails has also been reported elsewhere (Bear and Hansen, 1966).

Some of the wildlife species are found in a variety of habitats, whereas others are very limited in distribution. Deer mice (*Peromyscus maniculatus*) and coyotes (*Canis latrans*), for example, are found in most habitats, whereas western jumping mice (*Zapus princeps*) and cliff chipmunks (*Eutamias dorsalis*) are much more restricted. Still other species (especially birds) are migratory and are found only seasonally at the ranch. For example, most of the small perching birds are summer residents, and certain raptors are strictly winter residents. Mule deer are the most migratory mammal species. Although deer summer in the area, populations are highest during late fall and spring, when the deer are passing through on migratory routes. Finally, some animals are apparent only during spring and summer because of hibernation or estivation. Some ground squirrel species, as well as amphibians and reptiles, exhibit this behavior.

The lists that follow contain 31 mammal species, 106 birds, 9 reptiles, and 1 amphibian verified in the Gund Research and Demonstration Ranch vicinity in the course of wildlife inventory during 1977-78, as well as species confirmed by area ranchers within the last 5 years. These lists are by no means complete. Many species suspected of inhabiting the area have simply not been detected. Wildlife inventory to this point has been designed to estimate relative abundance or densities of key species whose populations will be monitored as habitat changes occur. A more diverse and complete species list was compiled by Jean Linsdale (1938). This author and her associates made an in-depth, 3-year inventory of vertebrate wildlife in the Toiyabe Mountains, about 50 miles (75 km) from the Gund Research and Demonstration Ranch. This report enumerated 47 mammal species, 152 birds, 13 reptiles, and 3 amphibians for an area that is ecologically similar to the Gund Research and Demonstration Ranch.



## Annotated List of Mammals

| <u>Family</u> | <u>Scientific name</u> | <u>Common name</u> | <u>Habitat in which observed</u> | <u>Abundance</u> |
|---------------|------------------------|--------------------|----------------------------------|------------------|
|---------------|------------------------|--------------------|----------------------------------|------------------|

### Order ARTIODACTYLA

|          |                            |           |                                    |          |
|----------|----------------------------|-----------|------------------------------------|----------|
| Cervidae | <u>Odocoileus hemionus</u> | Mule deer | Pinyon/juniper, sagebrush, alfalfa | Moderate |
|----------|----------------------------|-----------|------------------------------------|----------|

Mule deer are the major big game species of the Gund R. & D. Ranch vicinity. They are most active in early morning, evenings, and moonlit nights. They feed primarily on shrubs and twigs but also utilize grasses and forbs. Mule deer may compete with livestock for forage. They are occasionally observed in ranch alfalfa fields.

### Order CARNIVORA

|         |                      |        |              |      |
|---------|----------------------|--------|--------------|------|
| Canidae | <u>Canis latrans</u> | Coyote | All habitats | High |
|---------|----------------------|--------|--------------|------|

Coyotes eat almost anything, including carrion, insects, nuts, and berries. Rodents and rabbits are their mainstay, but coyotes also kill sheep and calves. Although nocturnal, they may be active at any time and can be seen in almost any habitat. Hides have been valuable for the past 6 years.

|  |                                 |          |                |         |
|--|---------------------------------|----------|----------------|---------|
|  | <u>Urocyon cinereoargenteus</u> | Gray fox | Pinyon/juniper | Unknown |
|--|---------------------------------|----------|----------------|---------|

This fox is probably rare in the Gund R. & D. Ranch area. It is smaller than the coyote but larger than a kit fox. It has a dark stripe on the dorsal side of its tail. Though highly omnivorous, this secretive nocturnal predator preys chiefly on small mammals.

|  |                        |         |            |         |
|--|------------------------|---------|------------|---------|
|  | <u>Vulpes macrotis</u> | Kit fox | Greasewood | Unknown |
|--|------------------------|---------|------------|---------|

This smallest of canines is about jackrabbit size and has very large ears. Kit foxes spend their days in burrows and hunt at night for rodents (especially kangaroo rats), rabbits, and insects. They prefer low desert vegetation.

|         |                       |               |                |     |
|---------|-----------------------|---------------|----------------|-----|
| Felidae | <u>Felis concolor</u> | Mountain lion | Pinyon/juniper | Low |
|---------|-----------------------|---------------|----------------|-----|

Mountain lions are typically restricted to higher areas of dense vegetation or rugged terrain. In the Gund R. & D. Ranch vicinity, as in most of the west, the principal prey of mountain lions is mule deer. They also eat rodents and rabbits and sometimes kill livestock. Lions are very territorial and wide ranging. Secretive and chiefly nocturnal, they are seldom seen. A large adult was observed in the winter of 1977-78 about 1.5 km above the ranch headquarters in the Simpson Park Range.

| <u>Family</u> | <u>Scientific name</u> | <u>Common name</u> | <u>Habitat in which observed</u> | <u>Abundance</u> |
|---------------|------------------------|--------------------|----------------------------------|------------------|
| Felidae       | <u>Felis rufus</u>     | Bobcat             | Pinyon/juniper, riparian         | Moderate         |

This bob-tailed cat dens in rock crevices, hollow logs, and dead falls. Like the lion, the bobcat is very territorial, nocturnal, and secretive. Small mammals and birds are the major prey species taken by bobcats but they also kill deer occasionally. Prices for bobcat hides have skyrocketed in the past 10 years, and the resultant increased pressure on bobcat populations has caused recent concern about possible overharvest.

|            |                        |                    |           |         |
|------------|------------------------|--------------------|-----------|---------|
| Mustelidae | <u>Mustela frenata</u> | Long-tailed weasel | Sagebrush | Unknown |
|------------|------------------------|--------------------|-----------|---------|

This small carnivore preys primarily on small rodents and often uses the burrows of gophers for shelter. Although primarily nocturnal, it is also active by day.

|                           |               |           |         |
|---------------------------|---------------|-----------|---------|
| <u>Spilogale putorius</u> | Spotted skunk | Sagebrush | Unknown |
|---------------------------|---------------|-----------|---------|

This small skunk, often called a civet cat, feeds on mice, birds, insects, carrion, eggs, and some vegetation. It nests in burrows, rock piles, and beneath buildings. The fur is of some value.

|                      |        |                    |          |
|----------------------|--------|--------------------|----------|
| <u>Taxidea taxus</u> | Badger | Sagebrush, meadows | Moderate |
|----------------------|--------|--------------------|----------|

These animals feed on a variety of prey, including rodents, reptiles, insects, and eggs, but burrowing rodents are their mainstay. Badgers live in burrows and are primarily nocturnal. Holes dug by badgers are hazardous to livestock.

#### Order LAGOMORPHA

|           |                           |                         |   |      |
|-----------|---------------------------|-------------------------|---|------|
| Leporidae | <u>Lepus californicus</u> | Black-tailed jackrabbit | Sagebrush, greasewood, crested wheatgrass | High |
|-----------|---------------------------|-------------------------|---|------|

Black-tailed jackrabbits are the most abundant lagomorph in Grass Valley. They are most active from early evening to early morning. Jackrabbits feed on green vegetation in summer and buds, bark, and small twigs in winter. Twelve jackrabbits consume as much forage as one sheep and 59, as much as one cow.

|                              |              |                 |     |
|------------------------------|--------------|-----------------|-----|
| <u>Sylvilagus idahoensis</u> | Pygmy rabbit | Dense sagebrush | Low |
|------------------------------|--------------|-----------------|-----|

Pygmy rabbits are the least abundant lagomorph in the Gund R. & D. Ranch area. They are found primarily in tall sagebrush growing in clumps and feed primarily on sagebrush. Although primarily nocturnal, they may be seen throughout the day.

|                            |                     |                           |          |
|----------------------------|---------------------|---------------------------|----------|
| <u>Sylvilagus nuttalli</u> | Mountain cottontail | Sagebrush, pinyon/juniper | Moderate |
|----------------------------|---------------------|---------------------------|----------|

Cottontails are chiefly nocturnal and are most abundant in heavy brush along streams. They feed on green vegetation in summer and twigs and bark in winter.

| <u>Family</u>  | <u>Scientific name</u>  | <u>Common name</u>         | <u>Habit in which observed</u> | <u>Abundance</u> |
|----------------|---|----------------------------|--------------------------------|------------------|
| Order RODENTIA |   |                            |                                |                  |
| Cricetidae     | <u>Lagurus curtatus</u>   | Sagebrush vole             | Sagebrush, shadscale           | Low              |
|                | Sagebrush voles are active day or night. They feed on green vegetation.   |                            |                                |                  |
|                | <u>Microtus montanus</u>  | Mountain vole              | Meadows, crested wheatgrass    | Low              |
|                | These short-tailed mice feed on green vegetation. They make tunnels and runways through meadows by cutting grass stems. Voles have been known to kill hundreds of acres of sagebrush by bark stripping.   |                            |                                |                  |
|                | <u>Neotoma cinerea</u>  | Bushy-tailed woodrat       | Pinyon/juniper                 | Moderate         |
|                | Often called "pack rats", these rodents accumulate sticks, bones, and other material for nests in rock crevices or under logs. They eat green vegetation, twigs, and shoots and may store some food as dry hay.   |                            |                                |                  |
|                | <u>Onychomys leucogaster</u>  | Northern grasshopper mouse | Sagebrush, greasewood          | Low              |
|                | These carnivorous mice prey on insects, scorpions, other mice, and lizards, but also eat some seeds. They are chiefly nocturnal and live mostly in burrows of other animals.  |                            |                                |                  |
|                | <u>Peromyscus crinitus</u>  | Canyon mouse               | Rock areas of pinyon/juniper   | Low              |
|                | This nocturnal species nests among rocks or burrows beneath them and probably eats seeds and insects.   |                            |                                |                  |
|                | <u>Peromyscus maniculatus</u>   | Deer mouse                 | All habitats                   | High             |
|                | Deer mice are the most abundant and widespread Gund R. & D. Ranch rodent. They nest in ground burrows, trees, stumps, etc., and eat seeds, nuts, and insects. These animals are named for their large ears.   |                            |                                |                  |
|                | <u>Peromyscus truei</u>   | Pinyon mouse               | Pinyon/juniper, sagebrush      | Moderate         |
|                | Pinyon mice are very similar in appearance and habits to deer mice, but pinyon mice have even larger ears.  |                            |                                |                  |
| Erethizontidae | <u>Erethizon dorsatum</u>   | Porcupine                  | Pinyon/juniper                 | Low              |
|                | Porcupines are the most active at night but may be seen during the day. They feed on buds, small twigs, and inner bark of trees, and they den in hollow trees or natural caves in rocks. The last reported sighting of a porcupine in the Gund Ranch area was in 1973.        |                            |                                |                  |
| Geomyidae      | <u>Thomomys bottae</u>  | Valley pocket gopher       | Sagebrush, alfalfa             | Moderate         |
|                | Pocket gophers are active day and night throughout the year. They feed largely on roots and tubers as well as some surface vegetation. These animals are seldom seen above ground, spending most of their lives in burrows. Gophers can be very detrimental to alfalfa crops. |                            |                                |                  |

| <u>Family</u> | <u>Scientific name</u> | <u>Common name</u> | <u>Habitat in which observed</u>                     | <u>Abundance</u> |
|---------------|------------------------|--------------------|--|------------------|
| Heteromyidae  | <u>Dipodomys ordii</u> | Ord kangaroo rat   | Sagebrush, greasewood, shadscale, crested wheatgrass | Moderate         |

This species is nocturnal and active year round. Recent studies have shown that seeds of certain plants (i.e., Oryzopsis hymenoides) have higher germination rates if they are manipulated by a member of the Dipodomys genus (unpublished research, Kent McAdoo, SEA/AR, Reno, Nev.).

|                                 |                     |            |     |
|---------------------------------|---------------------|------------|-----|
| <u>Perognathus longimembris</u> | Little pocket mouse | Greasewood | Low |
|---------------------------------|---------------------|------------|-----|

Like all other heteromyids, these animals feed primarily on seeds, storing them in their external cheek pouches until they can be cached underground. They are nocturnal and become inactive in cold weather.

|                           |                          |   |      |
|---------------------------|--------------------------|---|------|
| <u>Perognathus parvus</u> | Great Basin pocket mouse | Sagebrush, crested wheatgrass, greasewood, pinyon/juniper | High |
|---------------------------|--------------------------|---|------|

This species is similar in appearance and habits to the little pocket mouse but is larger. This is the common heteromyid of the Gund R. & D. Ranch vicinity. It is especially abundant in sagebrush.

|           |                                  |                                |                      |          |
|-----------|----------------------------------|--------------------------------|----------------------|----------|
| Sciuridae | <u>Ammospermophilus leucurus</u> | White-tailed antelope squirrel | Shadscale, sagebrush | Moderate |
|-----------|----------------------------------|--------------------------------|----------------------|----------|

Antelope squirrels run with their tails curled over their backs, exposing the white undersurface for which they are named. This diurnal species is active throughout the year, even when snow covers the landscape. They eat seeds and insects and do not require drinking water.

|                          |                |                |          |
|--------------------------|----------------|----------------|----------|
| <u>Eutamias dorsalis</u> | Cliff chipmunk | Pinyon/juniper | Moderate |
|--------------------------|----------------|----------------|----------|

This species is similar in appearance and habits to the least chipmunk. However, the cliff chipmunk is larger, with indistinct stripes, and is found almost exclusively in pinyon/juniper woodland in this area.

|                         |                |                       |      |
|-------------------------|----------------|-----------------------|------|
| <u>Eutamias minimus</u> | Least chipmunk | Sagebrush, greasewood | High |
|-------------------------|----------------|-----------------------|------|

Least chipmunks are about the size of a large mouse. They are locally abundant in sagebrush communities, where they are often seen climbing in brush or running with tails straight up. Food (vegetation, seeds, nuts, insects, and meat) is gathered and stored from spring to fall.

| <u>Family</u> | <u>Scientific name</u>       | <u>Common name</u>      | <u>Habitat in which observed</u> | <u>Abundance</u> |
|---------------|------------------------------|-------------------------|----------------------------------|------------------|
| Sciuridae     | <u>Spermophilus beldingi</u> | Belding ground squirrel | Sagebrush adjacent to alfalfa    | Low              |

Belding ground squirrels are uncommon at the Gund R. & D. Ranch. They are typically found near green vegetation, which forms the basis of their diet. They hibernate in winter.

|                               |                                |                 |          |
|-------------------------------|--------------------------------|-----------------|----------|
| <u>Spermophilus lateralis</u> | Golden-mantled ground squirrel | Aspen, riparian | Moderate |
|-------------------------------|--------------------------------|-----------------|----------|

These diurnal rodents feed on fruit, seeds, insects, and meat, often storing their food. They hibernate during winter, emerging between March and May. Often mistakenly called "chipmunks," these squirrels have stripes that stop at the base of the neck (chipmunks have stripes the full length of their bodies).

|                                |                          |                       |     |
|--------------------------------|--------------------------|-----------------------|-----|
| <u>Spermophilus townsendii</u> | Townsend ground squirrel | Greasewood, sagebrush | Low |
|--------------------------------|--------------------------|-----------------------|-----|

These colonial squirrels feed on green vegetation and seeds. They live in burrows in the dry soil of sagebrush/grasslands. They become dormant between May and July, emerging sometime in January or February. These squirrels may damage nearby green crops.

|           |                       |                       |          |     |
|-----------|-----------------------|-----------------------|----------|-----|
| Zapodidae | <u>Zapus princeps</u> | Western jumping mouse | Riparian | Low |
|-----------|-----------------------|-----------------------|----------|-----|

Jumping mice are nocturnal and are typically found in lush vegetation near streams. They feed primarily on seeds. These mice hibernate from fall to spring and are good swimmers.



## Annotated List of Birds

| <u>Family</u>   | <u>Scientific name</u>          | <u>Common name</u> | <u>Habitat in which observed</u>     | <u>Abundance/ Occurrence</u> |
|---|---------------------------------|--------------------|--------------------------------------|------------------------------|
| Order ANSERIFORMES  |                                 |                    |                                      |                              |
| Anatidae  | <u>Anas acuta</u>               | Pintail            | Flooded meadows, springs             | Low/Migrant                  |
|   | <u>Anas cyanoptera</u>          | Cinnamon teal      | Flooded meadows, springs             | Low/Migrant                  |
|   | <u>Anas platyrhynchos</u>       | Mallard            | Flooded meadows, springs             | Low/Migrant                  |
| <p>These three species, commonly referred to as "puddle ducks," are surface feeders. They are chiefly vegetarians. Most ducks in the Gund R. &amp; D. Ranch vicinity are migrants, but a few may nest in the area.</p>  |                                 |                    |                                      |                              |
| Order CAPRIMULGIFORMES  |                                 |                    |                                      |                              |
| Caprimulgidae   | <u>Chordeiles minor</u>         | Common nighthawk   | Sagebrush                            | Moderate/Summer resident     |
| <p>Nighthawks become active just before dark but are sometimes seen in early morning as well. Diving birds on breeding grounds produce a strange musical "hum."</p>   |                                 |                    |                                      |                              |
|   | <u>Phalaenoptilus nuttallii</u> | Poorwill           | Sagebrush                            | Moderate/Summer resident     |
| <p>This bird is often seen in late summer along roads at night.</p>   |                                 |                    |                                      |                              |
| Order CHARADRIIFORMES   |                                 |                    |                                      |                              |
| Charadriidae  | <u>Charadrius vociferus</u>     | Killdeer           | Flooded meadows                      | Moderate/Summer resident     |
| <p>This bird has the curious habit of feigning a broken wing to distract intruders away from its nest. Killdeer feed on insects. Nests are located on the ground.</p>   |                                 |                    |                                      |                              |
| Laridae   | <u>Larus delawarensis</u>       | Ring-billed gull   | Low-elevation meadows, flooded playa | Low/Summer resident          |
| Recurvirostridae  | <u>Recurvirostra americana</u>  | American avocet    | Flooded meadows                      | Low/Migrant                  |
| <p>This handsome shorebird has a distinctive upturned slender bill. Avocets eat insects and aquatic life.</p>   |                                 |                    |                                      |                              |
| Scolopacidae  | <u>Numenius americanus</u>      | Long-billed curlew | Low-elevation meadows                | Low/Summer resident          |
| <p>Although it is not numerous, this interesting bird can be observed easily in the Gund Ranch vicinity. Its very long sickle-shaped bill and low "curlew" call make it easy to identify. When disturbed in nesting areas, the adults become very active and noisy.</p> |                                 |                    |                                      |                              |

| <u>Family</u>  | <u>Scientific name</u>    | <u>Common name</u> | <u>Habitat in which observed</u>     | <u>Abundance/ Occurrence</u> |
|--|---------------------------|--------------------|--------------------------------------|------------------------------|
| Order CICONIFORMES   |                           |                    |                                      |                              |
| Ardeidae   | <u>Ardea herodias</u>     | Great blue heron   | Cottonwood trees by hot pond         | Low/Migrant                  |
| This large, long-legged bird, often mistaken for a crane, is rarely seen at the Gund R. & D. Ranch. Herons feed on aquatic life, mice, and insects.  |                           |                    |                                      |                              |
|  | <u>Leucophoyx thula</u>   | Snowy egret        | Flooded meadows                      | Low/Migrant                  |
| These birds are easily distinguished from common egrets by their yellow feet. They feed on aquatic fauna in shallow water.   |                           |                    |                                      |                              |
| Order COLUMBIFORMES  |                           |                    |                                      |                              |
| Columbidae   | <u>Columba livia</u>      | Rock dove          | Ranch headquarters                   | Low/Permanent resident       |
|  | <u>Zenaida macroura</u>   | Mourning dove      | Sagebrush, greasewood pinyon/juniper | Moderate/ Summer resident    |
| Doves are the most abundant game bird (seasonally) at the Gund R. & D. Ranch. They eat grains, small seeds, and fruit. Nests are located in trees, shrubs, or on the ground.   |                           |                    |                                      |                              |
| Order FALCONIFORMES  |                           |                    |                                      |                              |
| Accipitridae   | <u>Accipiter cooperii</u> | Cooper's hawk      | Aspen, riparian                      | Low/Summer resident          |
| Cooper's hawks feed primarily on birds and small animals. Their flight is rapid, with short wing-beats interrupted by glides. Nests are commonly along stream courses with adjacent stands of trees.                       |                           |                    |                                      |                              |
|  | <u>Accipiter striatus</u> | Sharp-shinned hawk | Pinyon/juniper                       | Low/Summer resident          |
| This species is the smallest accipiter. Its appearance and flight are similar to a Cooper's hawk. Sharp-shinned hawks feed primarily on small birds.   |                           |                    |                                      |                              |
| Buteoninae   | <u>Aquila chrysaetos</u>  | Golden eagle       | Sagebrush, mountain brush            | Low/Summer resident          |
| Golden eagles are the largest bird of prey in the Gund R. & D. Ranch vicinity. They feed on rodents and rabbits. Most eagles in this area are observed at higher elevations. Nests (eyries) are usually located on cliffs. |                           |                    |                                      |                              |
|  | <u>Buteo jamaicensis</u>  | Red-tailed hawk    | Pinyon/juniper sagebrush             | Moderate/ Summer resident    |
| Redtails nest in woodlands but feed in open country. Nests are built typically in trees or cliffs.   |                           |                    |                                      |                              |
|  | <u>Buteo lagopus</u>      | Rough-legged hawk  | Sagebrush, meadows                   | Low/Winter resident          |
| This large hawk feeds almost entirely on rodents. It is one of the few birds that can be seen at the Gund R. & D. Ranch only in winter. Rough-legged hawks are able to hover with beating wings (similar to kestrels).     |                           |                    |                                      |                              |

| <u>Family</u>  | <u>Scientific name</u>   | <u>Common name</u> | <u>Habitat in which observed</u> | <u>Abundance/ Occurrence</u> |
|--|--------------------------|--------------------|----------------------------------|------------------------------|
| Order FALCONIFORMES  |                          |                    |                                  |                              |
| Buteoninae   | <u>Buteo regalis</u>     | Ferruginous hawk   | Sagebrush                        | Low/Permanent resident       |
| <p>These hawks also prey on rodents, and they nest in a wider variety of nesting sites than any other <u>Buteo</u> species. Sites include the tops of juniper or pinyon trees, as well as rock ledges.</p>                               |                          |                    |                                  |                              |
|  | <u>Buteo swainsoni</u>   | Swainson's hawk    | Sagebrush, meadows, alfalfa      | Moderate/ Summer resident    |
| <p>These hawks, along with redtails, are the most commonly observed <u>Buteo</u> species at the Gund R. &amp; D. Ranch. Swainson's hawks feed on rodents and insects and nest most often in trees or tall bushes.</p>                    |                          |                    |                                  |                              |
| Cathartidae  | <u>Cathartes aura</u>    | Turkey vulture     | Pinyon/juniper, sagebrush        | Low/Summer resident          |
| <p>These large birds are carrion feeders. They are often seen soaring in wide circles on V-shaped wings. Vultures nest in both trees and cliffs.</p>   |                          |                    |                                  |                              |
| Circinae   | <u>Circus cyaneus</u>    | Marsh hawk         | Meadows, alfalfa                 | Moderate/ Summer resident    |
| <p>Marsh hawks are "harriers," hawks with long, rounded wings and long tails. They feed primarily on rodents. In hunting, these birds glide rapidly near the ground and tilt from side to side. Nests are located on the ground.</p>     |                          |                    |                                  |                              |
| Falconidae   | <u>Falco columbarius</u> | Merlin             | Meadow                           | Low/Migrant                  |
| <p>Pigeon hawks are larger than kestrels in size, but smaller than prairie falcons. They commonly fly low over the ground, seldom soaring. Diet consists of small birds, mice, and insects.</p>  |                          |                    |                                  |                              |
|  | <u>Falco mexicanus</u>   | Prairie falcon     | Sagebrush                        | Low/Permanent resident       |
| <p>These birds have long pointed wings and fly very rapidly. Prairie falcons feed primarily on birds and rodents. They nest in crevices or holes in cliffs.</p>  |                          |                    |                                  |                              |
|  | <u>Falco sparverius</u>  | Kestrel            | Sagebrush, riparian              | Moderate/ Summer resident    |
| <p>Kestrels hunt from trees or poles, feeding chiefly on insects. Commonly observed along roadways on power lines, this bird is one of the most common raptors in the West. These falcons often hover before stooping on their prey.</p> |                          |                    |                                  |                              |

| <u>Family</u>  | <u>Scientific name</u>           | <u>Common name</u>  | <u>Habitat in which observed</u>                           | <u>Abundance/ Occurrence</u> |
|--|----------------------------------|---------------------|--|------------------------------|
| Order GALLIFORMES  |                                  |                     |  |                              |
| Phasianidae  | <u>Alectoris chukar</u>          | Chukar              | High-elevation sagebrush-grass                             | Low/Permanent resident       |
| This exotic bird has been observed only in a few canyons in the Gund R. & D. Ranch area. Chukars eat leaves and seeds. The species is a popular game bird.                   |                                  |                     |  |                              |
|  | <u>Lophortyx californicus</u>    | California quail    | Riparian   | Low/Permanent resident       |
| This game bird is most commonly seen in flocks feeding on the ground. Nesting occurs on the ground in grass-lined hollows.   |                                  |                     |  |                              |
|  | <u>Perdix perdix</u>             | Hungarian partridge | Sagebrush, cultivated land                                 | Low/Permanent resident       |
| Also an exotic, this bird has been observed only at the northern extreme of the ranch, around cultivated land.   |                                  |                     |  |                              |
| Tetraonidae  | <u>Centrocercus urophasianus</u> | Sage grouse         | Sagebrush  | Low/Permanent resident       |
| Sage grouse are closely associated with the sagebrush habitat. They eat sagebrush, grass, forbs, and insects. Nests are located at the base of shrubs.                       |                                  |                     |  |                              |
| Order PASSERIFORMES  |                                  |                     |  |                              |
| Alaudidae  | <u>Eremophila alpestris</u>      | Horned lark         | Crested wheatgrass, low-elevation meadows, sagebrush-grass | High/Permanent resident      |
| This is one of the most common birds at lower elevations in open, grassy areas. These birds feed on insects and small seeds and are commonly seen along roadsides in winter. |                                  |                     |  |                              |
| Bombycillidae  | <u>Bombycilla cedrorum</u>       | Cedar waxwing       | Riparian   | Low/Moderate                 |
| This species has been sighted only once at the Gund R. & D. Ranch. Waxwings eat fruits and berries and also catch insects like flycatchers.                                  |                                  |                     |  |                              |
| Corvidae   | <u>Aphelocoma coerulescens</u>   | Scrub jay           | Pinyon/juniper, mountain brush                             | Low/Permanent resident       |
| Like other members of the Family Corvidae (jays, magpies, crows), this bird is heavy billed and omnivorous.  |                                  |                     |  |                              |
|  | <u>Corvus brachyrhynchos</u>     | Common crow         | Sagebrush, low-elevation meadows                           | Low/Permanent resident       |
|  | <u>Corvus corax</u>              | Common raven        | All  | Moderate/Permanent resident  |
| This species is primarily a carrion feeder and is the most commonly seen large bird at the Gund R. & D. Ranch.   |                                  |                     |  |                              |

| <u>Family</u>  | <u>Scientific name</u>           | <u>Common name</u>     | <u>Habitat in which observed</u>         | <u>Abundance/ Occurrence</u> |
|--|----------------------------------|------------------------|--|------------------------------|
| Order PASSERIFORMES  |                                  |                        |  |                              |
| Corvidae   | <u>Gymnorhinus cyanocephalus</u> | Pinyon jay             | Pinyon/juniper                           | High/Permanent resident      |
| This is the most common jay in the pinyon/juniper woodland adjacent to the Gund R. & D. Ranch. Pinyon jays feed primarily on pine nuts, which they store in the fall and eat during the winter and spring. |                                  |                        |  |                              |
|  | <u>Nucifraga columbiana</u>      | Clark's nutcracker     | Pinyon/juniper                           | Low/Permanent resident       |
|  | <u>Pica pica</u>                 | Black-billed magpie    | Pinyon/juniper sagebrush, mountain brush | Low/Permanent resident       |
| This scavenger is the only large black and white North American land bird with a long wedge-shaped tail. Magpies nest in trees or shrubs.  |                                  |                        |  |                              |
| Fringillidae   | <u>Amphispiza belli</u>          | Sage sparrow           | Sagebrush                                | Moderate/Summer resident     |
| The sage sparrow is very secretive except during the spring breeding season. The dark tail is flicked nervously as the bird hops around. Nests are built in sagebrush or other shrubs.                     |                                  |                        |  |                              |
|  | <u>Amphispiza bilineata</u>      | Black-throated sparrow | Sagebrush, greasewood                    | Moderate/Summer resident     |
|  | <u>Carduelis psaltria</u>        | Lesser goldfinch       | Riparian                                 | Low/Summer resident          |
| Only the green-backed race of this species has been observed in the area.  |                                  |                        |  |                              |
|  | <u>Carduelis tristis</u>         | American goldfinch     | Riparian                                 | Low/Migrant                  |
|  | <u>Chodestes grammacus</u>       | Lark sparrow           | Low-elevation meadows, sagebrush         | Moderate/Summer resident     |
| This sparrow has a distinctive quail-like head. Lark sparrows flock together to feed even during nesting season.   |                                  |                        |  |                              |
|  | <u>Junco caniceps</u>            | Gray-headed junco      | Riparian                                 | Low/Permanent resident       |
|  | <u>Junco hyemalis</u>            | Dark-eyed junco        | Pinyon/juniper, riparian                 | Moderate/Permanent resident  |
| This bird is commonly observed in winter along streams in the pinyon/juniper zone. Juncos are ground dwellers and feed on seeds and small fruits.  |                                  |                        |  |                              |
|  | <u>Melospiza melodia</u>         | Song sparrow           | Riparian                                 | Low/Summer resident          |
|  | <u>Passerculus sandwichensis</u> | Savannah sparrow       | Low-elevation meadows, alfalfa           | Moderate/Summer resident     |
|  | <u>Passerina amoena</u>          | Lazuli bunting         | Riparian                                 | Low/Migrant                  |
| Lazuli buntings are most commonly seen in chokecherry thickets along intermittent streams in the Simpson Park Range.   |                                  |                        |  |                              |



| <u>Family</u>  | <u>Scientific name</u>   | <u>Common name</u>     | <u>Habitat in which observed</u> | <u>Abundance/ Occurrence</u> |
|--|--|------------------------|----------------------------------|------------------------------|
| Order PASSERIFORMES  |  |                        |                                  |                              |
| Fringillidae   | <u>Carpodacus mexicanus</u>  | House finch            | Ranch headquarters               | Low/Permanent resident       |
|  | <u>Pheucticus melanocephalus</u>   | Black-headed grosbeak  | Ranch headquarters, riparian     | Low/Permanent resident       |
|  | <u>Pipilo chlorurus</u>  | Green-tailed towhee    | Pinyon/juniper, sagebrush        | Moderate/Summer resident     |
| These secretive birds move about under low shrub cover. Nests are constructed on the ground or in brush.   |  |                        |                                  |                              |
|  | <u>Pipilo erythrophthalmus</u>   | Rufous-sided towhee    | Pinyon/juniper, sagebrush        | Moderate/Permanent resident  |
| Rufous-sided towhees are not as shy as the green-tailed towhee. They also frequent undergrowth. Nests are built in dense brush, close to or on the ground.                                 |  |                        |                                  |                              |
|  | <u>Poocetes gramineus</u>  | Vesper sparrow         | Low-elevation meadows, sagebrush | Low/Summer resident          |
| The name "vesper" sparrow is misleading, since this species sings no more in the evening than other sparrows.  |  |                        |                                  |                              |
|  | <u>Spizella arborea</u>  | Tree sparrow           | Ranch headquarters               | Low/Winter resident          |
|  | <u>Spizella breweri</u>  | Brewer's sparrow       | Sagebrush, greasewood            | High/Summer resident         |
| Except during winter, this is the most common and most abundant bird in the area. Like other sparrows, Brewer's sparrows depend primarily on seeds for food. Nests are found in sagebrush. |  |                        |                                  |                              |
|  | <u>Zonotrichia albicollis</u>  | White-throated sparrow | Sagebrush                        | Low/Migrant                  |
| This species was observed during spring in association with other secretive ground dwelling birds (e.g., green-tailed towhees).  |  |                        |                                  |                              |
|  | <u>Zonotrichia leucophrys</u>  | White-crowned sparrow  | High-elevation sagebrush         | Low/Summer resident          |
| Hirundinidae   | <u>Hirundo rustica</u>   | Barn swallow           | Ranch headquarters               | Low/Summer resident          |
|  | Swallows have wide mouths for capturing flying insects. Barn swallow nests are built of mud and are usually located in farm buildings. |                        |                                  |                              |
|  | <u>Stelgidopteryx ruficollis</u>   | Rough-winged swallow   | Ranch headquarters               | Low/Summer resident          |
|  | <u>Tachycineta thalassina</u>  | Violet-green swallow   | Ranch headquarters               | Low/Summer resident          |

| <u>Family</u>   | <u>Scientific name</u>               | <u>Common name</u>      | <u>Habitat in which observed</u>                     | <u>Abundance/ Occurrence</u> |
|---|--------------------------------------|-------------------------|--|------------------------------|
| Order PASSERIFORMES   |                                      |                         |  |                              |
| Icteridae   | <u>Agelaius phoeniceus</u>           | Red-winged blackbird    | Low-elevation meadows                                | Moderate/Summer resident     |
| Redwings frequently move about in flocks which often include other blackbird species. Although they consume farmers' grain, they also eat harmful insects during the breeding season.   |                                      |                         |  |                              |
|   | <u>Euphagus cyanocephalus</u>        | Brewer's blackbird      | Sagebrush, low-elevation meadows                     | Moderate/Summer resident     |
|   | <u>Icterus bullockii</u>             | Bullock's oriole        | Riparian   | Low/Summer resident          |
| The Bullock's oriole is the only oriole found at the Gund Ranch. The pouchlike nest is hung from a tree branch.   |                                      |                         |  |                              |
|   | <u>Molothrus ater</u>                | Brown-headed cowbird    | Low-elevation meadows                                | Moderate/Summer resident     |
| These birds are often seen feeding in mixed flocks with Brewer's blackbirds and red-winged blackbirds.  |                                      |                         |  |                              |
|   | <u>Sturnella neglecta</u>            | Western meadowlark      | Sagebrush, crested wheatgrass, low-elevation meadows | High/Summer resident         |
| Because of its bright colors, abundance, unwary behavior, and loud, melodious song, the meadowlark is one of the most popular western birds. Nests are located in grassy tussocks.  |                                      |                         |  |                              |
|   | <u>Xanthocephalus xanthocephalus</u> | Yellow-headed blackbird | Low-elevation meadows                                | Low/Summer resident          |
| This is the only bird in North America that has a yellow head and a black body.   |                                      |                         |  |                              |
| Laniidae  | <u>Lanius ludovicianus</u>           | Loggerhead shrike       | Sagebrush, crested wheatgrass                        | Moderate/Permanent resident  |
| These black-masked birds have heavy hooked beaks with which they hunt insects, small birds, and rodents. They often impale their prey on barbed wire. Nests are located in thorny shrubs or small trees.  |                                      |                         |  |                              |
| Mimidae   | <u>Oreoscoptes montanus</u>          | Sage thrasher           | Sagebrush, greasewood                                | High/Summer resident         |
| The loud, melodious song of this abundant summer resident makes its presence easily detectable. Sage thrashers eat damaging insects in alfalfa fields near sagebrush, but will also consume garden vegetables. Nests are located on the ground or in brush. |                                      |                         |  |                              |
| Motacillidae  | <u>Anthus spinoletta</u>             | Water pipit             | Low-elevation meadows                                | Low/Migrant                  |
| This sparrow-sized bird feeds on the ground, walking rather than hopping, with its tail bobbing rapidly. Pipits eat insects.  |                                      |                         |  |                              |

| <u>Family</u>  | <u>Scientific name</u>             | <u>Common name</u>          | <u>Habitat in which observed</u> | <u>Abundance/ Occurrence</u> |
|--|------------------------------------|-----------------------------|----------------------------------|------------------------------|
| Order PASSERIFORMES  |                                    |                             |                                  |                              |
| Paridae  | <u>Parus gambeli</u>               | Mountain chickadee          | Pinyon/juniper                   | Moderate/Permanent resident  |
| These small black-capped, bibbed birds nest in cavities in trees. Chickadees move about incessantly, searching for insects.  |                                    |                             |                                  |                              |
|  | <u>Parus inornatus</u>             | Plain titmouse              | Pinyon/juniper                   | High/Permanent resident      |
|  | <u>Psaltiriparus minimus</u>       | Bushtit                     | Pinyon/juniper riparian          | High/Permanent resident      |
| Bushtits travel in flocks, flitting restlessly through trees and bushes.   |                                    |                             |                                  |                              |
| Parulidae  | <u>Dendroica coronata audoboni</u> | "Audubon's" warbler         | Aspen                            | Low/Summer resident          |
|  | <u>Dendroica nigrescens</u>        | Black-throated gray warbler | Pinyon/juniper                   | Low/Summer resident          |
|  | <u>Dendroica petechia</u>          | Yellow warbler              | Riparian                         | Moderate/Summer resident     |
| This is the common warbler in willow thickets along intermittent streams in the Simpson Park Range adjacent to the Gund R. & D. Ranch.                             |                                    |                             |                                  |                              |
|  | <u>Dendroica townsendi</u>         | "Townsend's" warbler        | Pinyon/juniper                   | Low/Migrant                  |
| This warbler has been observed only during spring migration.   |                                    |                             |                                  |                              |
|  | <u>Geothlypis trichas</u>          | Yellowthroat                | Ranch cottonwoods                | Low/Summer resident          |
| Only one of these wrenlike warblers has been observed. This bird was seen near the bathing hot pond.   |                                    |                             |                                  |                              |
|  | <u>Oporornis tolmiei</u>           | MacGillivray's warbler      | Riparian                         | Low/Summer resident          |
|  | <u>Vermivora celata</u>            | Orange-crowned warbler      | Riparian                         | Low/Summer resident          |
| This nondescript warbler forages in low trees and shrubs and nests on the ground or in low shrubs.   |                                    |                             |                                  |                              |
|  | <u>Wilsonia pusilla</u>            | Wilson's warbler            | Riparian                         | Low/Permanent resident       |
| Ploceidae  | <u>Passer domesticus</u>           | House sparrow               | Ranch headquarters               | Low/Permanent resident       |
| Sittidae   | <u>Sitta canadensis</u>            | Red-breasted nuthatch       | Pinyon/juniper                   | Low/Permanent resident       |
| These tree-climbing birds are acrobatic, like chickadees and titmice, and often flock with these species. They eat insects from the bark of tree trunks and limbs. |                                    |                             |                                  |                              |

| <u>Family</u>   | <u>Scientific name</u>      | <u>Common name</u>       | <u>Habitat in which observed</u>     | <u>Abundance/ Occurrence</u> |
|---|-----------------------------|--------------------------|--------------------------------------|------------------------------|
| Order PASSERIFORMES   |                             |                          |                                      |                              |
| Sturnidae   | <u>Sturnus vulgaris</u>     | Starling                 | Riparian, pinyon/<br>juniper         | Low/Permanent<br>resident    |
| Sylviidae   | <u>Polioptila caerulea</u>  | Blue-gray<br>gnatcatcher | Pinyon/juniper                       | Low/Summer<br>resident       |
| Gnatcatchers are active birds, constantly flicking their long tails while gathering insects from trees or bushes.   |                             |                          |                                      |                              |
|   | <u>Regulus calendula</u>    | Ruby-crowned<br>kinglet  | Aspen                                | Low/Summer<br>resident       |
| Thraupidae  | <u>Piranga ludoviciana</u>  | Western tanager          | Pinyon/juniper                       | Low/Summer<br>resident       |
| Tanagers are omnivorous. They feed on insects in spring and early summer, then berries and fruits later in the year. Nests are located in the fork of a horizontal tree branch.   |                             |                          |                                      |                              |
| Troglotidae   | <u>Salpinctes obsoletus</u> | Rock wren                | High-elevation<br>rocky outcrops     | Moderate/Summer<br>resident  |
| This bird has the curious unexplained habit of constructing a "path" of rock chips leading to its nest.   |                             |                          |                                      |                              |
|   | <u>Thryomanes bewickii</u>  | Bewick's wren            | Sagebrush                            | Low/Permanent<br>resident    |
|   | <u>Troglodytes aedon</u>    | House wren               | Aspen                                | Low/Summer<br>resident       |
| These cavity-nesting birds eat insects and arthropods. Their rounded tails are often cocked upward.   |                             |                          |                                      |                              |
| Turdidae  | <u>Sialia currucoides</u>   | Mountain bluebird        | Meadows, riparian,<br>mountain brush | Low/Summer<br>resident       |
| These birds hover low over the ground while hunting insects. They often catch their prey on the wing. Nests are located in a tree cavity, usually an abandoned woodpecker's hole. |                             |                          |                                      |                              |
|   | <u>Sialia mexicana</u>      | Western bluebird         | Greasewood                           | Low/Migrant                  |
| The western bluebird, a cavity nester, has been sighted only once at the Gund R. & D. Ranch.  |                             |                          |                                      |                              |
|   | <u>Turdus migratorius</u>   | Robin                    | Riparian,<br>sagebrush               | Low/Summer<br>resident       |
| Tyrannidae  | <u>Contopus sordidulus</u>  | Western wood<br>pewee    | Riparian                             | Low/Summer<br>resident       |
|   | <u>Empidonax difficilis</u> | Western flycatcher       | Riparian                             | Low/Summer<br>resident       |
| This bird is the only western <u>Empidonax</u> with a yellow throat.  |                             |                          |                                      |                              |

| <u>Family</u>   | <u>Scientific name</u>        | <u>Common name</u>        | <u>Habitat in which observed</u> | <u>Abundance/ Occurrence</u> |
|---|-------------------------------|---------------------------|----------------------------------|------------------------------|
| Order PASSERIFORMES   |                               |                           |                                  |                              |
| Tyrannidae  | <u>Empidonax wrightii</u>     | Gray flycatcher           | Sagebrush                        | Low/Summer resident          |
| This bird is the principal nesting flycatcher in sagebrush habitat. Its nest consists of a cup of grass in sagebrush, pinyon, or juniper.   |                               |                           |                                  |                              |
|   | <u>Muscivora forficata</u>    | Scissor-tailed flycatcher | Meadows                          | Low/Accidental               |
| This bird has been sighted once at the Gund R.&D. Ranch, and must be considered an "accidental" visitor. The ranch is 1500 km from this bird's normal range. The long scissorlike tail makes this species unmistakable. |                               |                           |                                  |                              |
|   | <u>Sayornis saya</u>          | Say's phoebe              | Pinyon/juniper                   | Low/Summer resident          |
|   | <u>Tyrannus verticalis</u>    | Western kingbird          | Ranch head-quarters, sagebrush   | Moderate/Summer resident     |
| Kingbirds eat flying insects. They are aggressive and are often seen chasing large birds (e.g., hawks and crows).   |                               |                           |                                  |                              |
| Vireonidae  | <u>Vireo gilvus</u>           | Warbling vireo            | Pinyon/juniper                   | Low/Summer resident          |
| Order PICIFORMES  |                               |                           |                                  |                              |
| Picidae   | <u>Colaptes auratus caper</u> | Red-shafted flicker       | Sagebrush, pinyon/juniper        | Moderate/Permanent           |
| The white rump and undulating flight of this bird make it easy to identify. It is the most common woodpecker in the Gund R. & D. Ranch vicinity.  |                               |                           |                                  |                              |
|   | <u>Dendrocopos villosus</u>   | Hairy woodpecker          | Riparian                         | Low/Permanent                |
| This woodpecker has a louder call than that of the smaller downy woodpecker, ( <u>Dendrocopos pubescens</u> ), with which it is easily confused.  |                               |                           |                                  |                              |
| Order STRIGIFORMES  |                               |                           |                                  |                              |
| Strigidae   | <u>Aegolius acadicus</u>      | Saw-whet owl              | Sagebrush,                       | Low/Winter resident          |
| These owls are small and often very tame. They eat mostly small mammals and insects.  |                               |                           |                                  |                              |
|   | <u>Asio flammeus</u>          | Short-eared owl           | Greasewood                       | Low/Summer resident          |
| This owl is active before dark. The "ears" of this species are hard to see. Nests are located on the ground.  |                               |                           |                                  |                              |
|   | <u>Asio otus</u>              | Long-eared owl            | Pinyon/juniper                   | Low/Summer resident          |



|                         |                  |                              |                           |
|-------------------------|------------------|------------------------------|---------------------------|
| <u>Bubo virginianus</u> | Great horned owl | Pinyon/juniper,<br>sagebrush | Low/Permanent<br>resident |
|-------------------------|------------------|------------------------------|---------------------------|

This species is the largest owl in the area. Like most owls, great horned owls are nocturnal, and are best seen and heard at dusk. They hunt rodents, rabbits, and birds.

|                             |               |                          |                     |
|-----------------------------|---------------|--------------------------|---------------------|
| <u>Speotyto cunicularia</u> | Burrowing owl | Sagebrush,<br>greasewood | Low/Summer resident |
|-----------------------------|---------------|--------------------------|---------------------|

This small, long-legged owl is diurnal. It hovers when hunting and nests in burrows.

|           |                  |          |           |                           |
|-----------|------------------|----------|-----------|---------------------------|
| Tytonidae | <u>Tyto alba</u> | Barn owl | Sagebrush | Low/Permanent<br>resident |
|-----------|------------------|----------|-----------|---------------------------|

This long-legged "monkey faced" owl hunts mice and rats in open habitats. It nests in tree cavities, barns, and abandoned buildings.

## Annotated List of Reptiles and Amphibians

| <u>Family</u>   | <u>Scientific name</u>              | <u>Common name</u>   | <u>Habitat in which observed</u> |
|---|-------------------------------------|----------------------|----------------------------------|
| Order SQUAMATA  |                                     |                      |                                  |
| Suborder SAURIA (Lizards)   |                                     |                      |                                  |
| Iguanidae   | <u>Gambelia wislizenii</u>          | Leopard lizard       | Sagebrush, greasewood            |
| Leopard lizards are large lizards with "leopard" spots. They prey upon insects, small mammals, and other lizards, often lying in wait in the shade where their spotted pattern blends in. These lizards are bipedal when running fast.  |                                     |                      |                                  |
|   | <u>Phrynosoma platyrhinos</u>       | Desert horned lizard | Sagebrush                        |
| "Horny toads," as they are often called, are covered dorsally with short spines. Insects are their major food.  |                                     |                      |                                  |
|   | <u>Sceloporus graciosus</u>         | Sagebrush lizard     | Sagebrush                        |
| Sagebrush lizards are similar to western fence lizards but are smaller and have smaller scales. They feed on insects, spiders, ticks, mites, snails, and scorpions.   |                                     |                      |                                  |
|   | <u>Sceloporus occidentalis</u>      | Western fence lizard | Pinyon/juniper                   |
| These lizards are very common in the West. They have blue sides and are often called "bluebellies." Insects and spiders are the major prey for this species.  |                                     |                      |                                  |
|   | <u>Uta stansburiana</u>             | Side-blotched lizard | Sagebrush, greasewood            |
| These are among the most abundant lizards in arid and semi-arid regions of the West. They prey on insects, ticks, scorpions, etc.   |                                     |                      |                                  |
| Teiidae   | <u>Cnemidophorus tigris</u>         | Western whiptail     | Sagebrush                        |
| This active lizard avoids dense grassland and thick shrub growth, preferring areas of sparse vegetation that facilitate running. Whiptails eat spiders, scorpions, and insects, some of which they obtain by digging.   |                                     |                      |                                  |
| Suborder SERPENTES (Snakes)   |                                     |                      |                                  |
| Colubridae  | <u>Masticophis flagellum piceus</u> | Red racer            | Sagebrush                        |
| Racers are slim, fast-moving snakes. They are very tolerant of warm, dry weather and may move about even on hot days. Racers prey on birds, eggs, other reptiles, insects, carrion, and small mammals. They seize their prey swiftly and eat it without constriction.   |                                     |                      |                                  |
|   | <u>Pituophis melanoleucus</u>       | Gopher snake         | Sagebrush, alfalfa               |
| Gopher snakes are good climbers and burrowers, active by day except in hot weather. When disturbed, they hiss loudly and sometimes even flatten their heads and vibrate their tails, causing them to frequently be mistaken for rattlers. They feed on rabbits, rodents, birds, eggs, and lizards, killing their prey by constriction. Gopher snakes are very common in Grass Valley. |                                     |                      |                                  |

| <u>Family</u>                     | <u>Scientific name</u>          | <u>Common name</u>            | <u>Habitat in which observed</u> |
|-----------------------------------|---------------------------------|-------------------------------|----------------------------------|
| Order SALIENTIA (Frogs and Toads) |                                 |                               |                                  |
| Pelobatidae                       | <u>Scaphiopus intermontanus</u> | Great Basin<br>spadefoot toad | Wet meadows<br>near playa        |

At the Gund R. & D. Ranch, spadefoot toads breed in pools that form after heavy rains and in irrigation ditches. They are active primarily at night during spring and summer rains. Dry periods are spent in rodent burrows or self-made burrows.

|           |                         |                     |           |
|-----------|-------------------------|---------------------|-----------|
| Viperidae | <u>Crotalus viridis</u> | Western rattlesnake | Sagebrush |
|-----------|-------------------------|---------------------|-----------|

These are the only pit vipers in the Gund R. & D. Ranch vicinity. Venom from these snakes is poisonous. The rattling sound they produce when alarmed is caused by the shaking of a series of loosely interlocking horny segments at the end of the tail. Small mammals, birds, and lizards are major food items for rattlesnakes.

## CULTURAL RESOURCES IN GRASS VALLEY

Since all human works are cultural in nature, the term "cultural resources" can be very inclusive. The term is used here to refer to evidence of the human past--tools, waste products, and structures: their distribution in space and time and their relationship to the natural environment. Documents are also cultural resources, but most documents concerning Grass Valley are not located there; rather, they repose in libraries, county records, and other archives. Documents constitute the historic record, whereas artifacts constitute the archeological record and can be either historical or prehistoric.

Cultural resources in Grass Valley are both prehistoric and historic. The former are Indian remains that range in age from perhaps 8,000 B.C. to about A.D. 1860. The latter are both Indian and European sites dating from 1860 to the present.

The historic period (and to a lesser extent, the prehistoric period as well) has been outlined by Knudsen (1975). The archeology of the valley, both prehistoric and early historic, is known from her efforts (Magee, 1964, 1966, 1967), from the long-term study conducted by C. William Clewlow and his associates and summarized in two collections of papers (Clewlow and Rusco, 1972; Clewlow et al., 1978), from several small surveys done along geophysical test lines by the Nevada State Museum (Callaway, 1977), and from a preliminary archeological reconnaissance of the Gund Research and Demonstration Ranch conducted by the Archaeological Survey, University of Nevada - Reno (Davis and Elston, 1978).

By far the most intensive archeological studies have been those of Clewlow and his associates in the southern part of the valley on the Grass Valley Ranch. Over 40 archeological sites have been discovered in this area, although it has not been as intensively or systematically searched as would be required by current BLM standards. Nevertheless, several different types of Indian archeological sites have been recognized (Clewlow and Pastron, 1972).

Occupational sites include small campsites, rock shelters, and large village sites. The last are usually located on the valley floor near permanent water and associated with seed-producing plant communities.

Hunting sites are those with small scatters of flakes and chipped-stone tools but not seed-gathering and seed-processing equipment, such as milling-stones and pottery. Also included are sites with isolated chipped-stone artifacts (especially projectile points) and rock cairns thought to be mountain sheep ambush sites. Hunting sites are usually found in uplands along game trails, near good water and browse.

Gathering sites are those with pottery-sherd and grinding-stone scatters. They are usually found in alluvial flats at the mouths of canyons, especially along streams and marshes with communities of seed-bearing plants.

Special purpose sites are quarries, workshops, burial caches, and other finds not related directly to subsistence activities.

In addition to devising a typology of archeological sites, Clewlow and Pastron (1972) have divided the cultural history of Grass Valley into distinct phases: early prehistoric, middle prehistoric, late prehistoric, and historic.

The early prehistoric phase is not well understood. Artifacts diagnostic of this period are rare and are confined wholly to fragments of large projectile points: concave based, Angosturalike, and the Humboldt Concave Base A type. Hector (1978) also reported a fluted point, but this find has not been further documented. If correct, however, it suggests that the first occupation of Grass Valley began at the end of the Pleistocene, some 10,000 years ago. The other point types indicate occupation through the Anathermal and Altithermal intervals to perhaps 5,000 years ago. During the early prehistoric phase, Grass Valley seems to have been used only intermittently by small groups of hunters.

The middle prehistoric phase apparently spans the Medithermal interval from about 4,500 to 1,000 years ago. This phase is marked by such diagnostic projectile-point series as Elko and Rose Spring-Eastgate and by the Humboldt Concave Base B type. Sites of this period are found both in the uplands and on the valley floor, and all major types, including rock shelters and four major settlements, are represented. The latter each contain three or four small, circular house depressions scattered along a permanent stream. The distribution and type of sites from this period indicate more or less permanent occupation of the valley by small bands exploiting a variety of upland and lowland resources from a fixed base.

The late prehistoric phase ranges from about A.D. 1000 to A.D. 1860. Pottery was introduced to the valley during this phase, and settlements consist of three to eight circular houses. Both house size and settlement size are larger than in the preceding phase. As with the middle prehistoric phase, however, sites of all major types are found, and they are similarly distributed.

The historic phase in Grass Valley began in about 1860 and was marked by the introduction of Euroamerican trade goods. For the Shoshone Indians, this phase ended by 1920 as they left to seek work in Austin or to live on the reservation in the Reese River Valley. To date, four sites are known from this period, all large occupation or village sites on the floor of the valley. The number of structural remains on these sites ranges from 12 to 30. A few structures are still standing, others are collapsed, and others are mere depressions or mounds. Although evidence of hunting and gathering activities is found within the Indian village sites of the historic phase, no specialized hunting or gathering sites from this period are known. Thus, it appears that in the historic phase, the Indians lived off the ranch in a kind of feudal economic system.

Many Euroamerican sites in Grass Valley are from the historic phase, and more are being created all the time. These include houses, outbuildings, fences and corrals, dumps, mines and borrow pits, at least one mill, roads, and landing strips. Many of those structures date to the earliest historic times and preserve architectural styles and construction methods unique to the local region and to the Great Basin.

The archeology of the Gund Research and Demonstration Ranch itself is known from the reconnaissance done by the Archaeological Survey, Anthropology Department, University of Nevada - Reno, in order to evaluate the effects on



cultural resources of the transfer of BLM land to the Gund Research and Demonstration Ranch.

Considering both the BLM transfer lands and the deeded land of the ranch, the study area comprised a strip of land about 2 miles (3.2 km) wide and 8 miles (12.9 km) long. The area can be divided into several different environmental zones for a preliminary discussion of site distribution (table 5).

Seventeen archeological sites were located and recorded in this study. Eight sites are on the deeded land; seven are on the transfer land; and two are off the study area but adjacent to it.

Departing somewhat from the site typology devised for the southern part of the valley by Clewlow and Pastron (1972), sites were tentatively classified according to their function as inferred from the kinds of artifacts and features found in association. Debitage (cores, broken bifaces, and flakes) indicate tool manufacture.

Table 5.--Environmental zones of the study area in relation to cultural resource analysis

| Topographic type   | Vegetation  | Surface soil type   |
|--|---|---|
| Heads of alluvial fans   | Low brush and grasses on old surfaces<br>Tall brush, grass, and <i>Salix</i> spp. adjacent to stream channels | Desert pavement on old surfaces<br>Sandy to gravelly alluvium adjacent to stream channels |
| Remainder of alluvial fans   | Low brush and grasses   | Generally rocky desert pavement   |
| Pleistocene shore features (sandy ridges)                                  | Low brush to tall brush and grasses   | Sand to gravel  |
| Holocene shore features (alkali flats, low sandy ridges adjacent to playa) | Mostly <i>Sarcobatus vermiculatus</i>   | Sand to silt  |
| Alluvial flat along McClusky Creek   | Tall brush and grass  | Sand to silt  |
| Meadows and marshy places  | <i>Elymus cinereus</i> or <i>Distichlis spicata</i>   | Silt and clay   |

Modified and utilized flakes and broken projectile points indicate tool repair. Food preparation is inferred from grinding stones or hearths. Task sites are specialized sites where resources were acquired and minimally processed or where some limited activity is indicated. Base camps are generalized sites with evidence of food preparation.

An area of about 1 square mile (2.6 km<sup>2</sup>) was examined in detail. This small area consists of two parcels of land scheduled for surface disturbance, the Williams Field and the 160 acres, both located in the Walti Unit, plus several irregularly shaped areas chosen on the basis of known artifacts, interesting geological environment, and likely archeological potential. Seventeen sites were found and classified by environmental setting (table 6).

Although the areas surveyed were not chosen randomly, the data provide a first approximation of the likely density and distribution of sites in the area. Thus, the total number of sites in the deeded land is probably about 68, of which 8 are already known. Sites are to be expected in each of the environmental zones on the ranch, although site type and density are likely to vary. The Pleistocene shorelines seem to have been particularly attractive places to work and live for both the prehistoric and the historic inhabitants of the valley.

Table 6.--*Environmental setting, site type, and age of sites in the study area*

| Environmental setting      | Site no.         | Site type                                   | Age                        |
|----------------------------|------------------|---|----------------------------|
| Heads of alluvial fans     | EU57             | Task (hunting, tool repair and manufacture) | Between A.D. 1 and 500     |
| Remainder of alluvial fans | EU53,56          | Task (tool manufacture)                     | Unknown                    |
| Pleistocene shore features | LA941            | Base camp                                   | Unknown                    |
|                            | LA944            | Base camp                                   | Between A.D. 1200 and 1850 |
|                            | LA940, 942, 946; | Task (hunting, tool repair and manufacture) | Unknown                    |
|                            | LA943            | Dump  | Historic                   |
|                            | LA945            | Homestead                                   | Historic                   |
|                            | LA948            | Stage Road                                  | Historic                   |
| Holocene shore features    | LA939, 937       | Task (tool manufacture)                     | Unknown                    |
| Alluvial flat              | EU54, LA938      | Task (hunting tool manufacture)             | Unknown                    |
|                            | EU41             | Base camp with subsurface component         | Unknown                    |

To date, the northern end of the valley appears to lack the large lowland occupation or village sites with house remains characteristic of the late prehistoric and historic phases in the Grass Valley Ranch area. Likewise lacking is evidence of a subsistence pattern oriented toward lacustrine resources, which is characteristic of late Pleistocene and early Holocene cultures in other parts of the Great Basin (Clewlow, 1968; Bedwell, 1973).

Overall, the cultural resources of Grass Valley are rich and varied. The degree of preservation and lack of disturbance to archeological sites there, particularly those from the early historic period, may be unique. Clewlow and Patron (1972) have proposed that the subsistence economy and social structure of prehistoric people in the valley were generally tending toward more dependence on the gathering of plant foods and less dependence on hunting, perhaps leading to the kind of protoagricultural subsistence practices (broadcast sowing and irrigation) that developed in other parts of the Great Basin. This hypothesis is supported by the evidence of larger, more nucleated settlements with larger houses, which may reflect social and demographic changes expected to result from a more specialized economic orientation.

#### PURPOSE OF THE GUND RANCH RESEARCH AND DEMONSTRATION RANCH AND ITS RANGE-FORAGE-LIVESTOCK RESEARCH PROGRAM

Historically, university research stations have been developed to study problems associated with specific sites, such as intensive agronomic production or livestock feedlot production. Unfortunately, relatively few stations have been developed to study livestock production under the arid conditions existing in the Western United States. Additionally, "site specific" stations lack the facilities to study total production and its effect on the environment.

This inadequacy has long been recognized by the University of Nevada. In fact, the earliest Nevada Agricultural Experiment Station publication, in 1885, recognized that land and water management were keys to the future of Nevada. In 1969, the Citizen Advisory Committee to the College of Agriculture recommended that the University obtain a typical Nevada ranch to develop, test, and demonstrate practices in rangeland, water, and livestock management on a practical scale, which has previously been impossible due to availability of lands.

The gift of the Gund Research and Demonstration Ranch to the University from George Gund III in 1973, followed by the acquisition of 8,000 acres of surrounding National Resource Lands (Public Law 95-278) in 1979, has allowed the University to attain the nearly 100-year-old goal of operating a truly representative range-forage-cattle research station.

The total lands of the Gund Research and Demonstration Ranch (11,000 acres; 4455 ha) include mainly alluvial fans and extensive bottom lands. This area consists of degraded rangeland communities, degraded meadows, and pastures--most of which can be improved by brush and weed control, seeding of adapted forage species, and intensive grazing management. Additionally, irrigated forage production on present lands will be increased through better production techniques. Development of new water, utilizing a variety of techniques, will greatly facilitate overall production.

Much technology has been developed through earlier research to accomplish many of these improvements; however, large-scale testing will greatly enhance their ultimate commercial application. Additionally, the effect of these treatments on deeded lands will be closely evaluated in regards to existing vegetation, watershed, soil stabilization, wildlife, and related cultural values. In addition to present deeded properties, a 4,400 animal unit month (AUM) permit for National Resource Land (BLM) surrounds the ranch. This permit includes a wide variety of plant communities, from salt desert shrub to near alpine types.

Improvement of deeded rangelands and pastures will allow considerable flexibility in grazing patterns on the adjacent National Resource Land. Historically, grazing use of this area has been heavy. Thus, the intensive use of deeded lands will considerably relax grazing pressure on the adjacent Federal lands, providing the opportunity for research on the interaction of livestock and watershed, wildlife habitat, streambank protection, recreational use, and a variety of other important factors under lighter grazing pressure.

A unique and perhaps most important factor in the development of the Gund Research and Demonstration Ranch has been the development of background information. Most experiment stations have developed in a fashion that precluded a basic knowledge of existing conditions at the time of development. Fortunately, flora and fauna have been well documented prior to development. Additionally, the historical production of red meat from this unit is known. Thus, the true effect of rangeland and pasture improvement and increased livestock production upon the environment at the ranch can be studied.

It is the goal of the University of Nevada and the Science and Education Administration, in cooperation with other agencies, to develop an intensive range-forage-livestock production program at the Gund Research and Demonstration Ranch for comprehensive study of the many problems involved with management of both deeded and National Resource Lands. The results of these studies will be applicable to improved management of pasture and rangelands for increased livestock production in Nevada and adjacent States, including both the public and private domain.

## LITERATURE CITED

Anonymous.

1964. Nevada Wildlife centennial issue. Nevada Wildlife 5:1-64.

Bear, G. D., and R. M. Hansen.

1966. Food habits, growth, and reproduction of white-tailed jackrabbits in southern Colorado. Colorado Agricultural Experiment Station Technical Bulletin No. 90, 59 p.

Bedwell, S. F.

1973. Fort Rock Basin prehistory and environment. University of Oregon Books, Eugene, Oreg. 189 p.



- Billings, W. D.  
1951. Vegetational zonation in the Great Basin of western North America. In *Les bases ecologiques de la regeneration de la vegetation des zones arides*. International Colloquium, International Union of Biological Sciences, Series B. 2:101-122.
- Blackburn, W. H., R. E. Eckert, Jr., and P. T. Tueller.  
1969. Vegetation and soils of the Coils Creek watershed. College of Agriculture, University of Nevada, Bulletin No. R 48, 82 p.
- Buechner, H. K.  
1960. The bighorn sheep in the United States, its past, present, and future. Wildlife Monograph 4. 174 p.
- Callaway, C.  
1977. Archaeological reconnaissance final report for Continental Oil Company seismic lines in Grass Valley, Nevada. Short Report, Archaeological Services, Nevada State Museum, Carson City. P. 1-9.
- Clewlow, C. W., Jr.  
1968. Surface archaeology of the Black Rock Desert. University of California Archaeological Survey Report No. 73, Berkeley.
- Clewlow, C. W., Jr., and A. G. Pastron.  
1972. Preliminary investigations. P. 11-32. In Clewlow, C. W., Jr., and M. Rusco, editors, *The Grass Valley archaeological project: collected papers*, Nevada Archaeological Survey Research Paper No. 3, Reno.
- Clewlow, C. W., Jr. and M. Rusco, editors.  
1972. *The Grass Valley archaeological project: collected papers*. Nevada Archaeological Survey Research Paper No. 3, 150 p. Reno.
- Clewlow, C. W., Jr., H. F. Wells, and R. D. Ambro, editors.  
1978. History and prehistory at Grass Valley, Nevada. Monograph VII, Institute of Archaeology, University of California, Los Angeles. 173 p.
- Davis, J. O., and Robert Elston.  
1978. Preliminary reconnaissance of Gund Ranch. Archaeological Survey, Anthropology Department, University of Nevada, Report to Agriculture Experiment Station, Max C. Fleischmann College of Agriculture. 15 p.
- Guilluly, James, and H. A. Masursky.  
1965. Geology of the Cortez Quadrangle, Nevada. U.S. Geological Survey Bulletin No. 1175, 117 p.
- Hector, S. M.  
1978. An early basalt site located in an historic Shoshone village. In Clewlow, C. W., H. F. Wells, and R. D. Ambro, editors, *History and prehistory at Grass Valley, Nevada*. Monograph VII, Institute of California, Los Angeles. P. 141-160.
- Houghton, J., C. Sakamoto, and R. Gifford.  
1975. Nevada's weather and climate. Nevada Bureau of Mines and Geology. University of Nevada, Reno. P. 141-160.



Hubbs, C. L., and R. R. Miller.

1948. The Great Basin, with emphasis on glacial and postglacial times.

II. The zoological evidence: correlation between fish distribution and hydrographic history in the desert basins of Western United States. University of Utah Bulletin 38:17-166.

Klebenow, D. A.

1972. The habitat requirements of sage grouse and the role of fire in management. Proceedings of the Tall Timbers Fire Ecology Conference 11: 305-315.

Knudsen, M. F.

1975. Here is our valley. Helen Marye Thomas Memorial Series: No. 1 University of Nevada Press, Reno. 120 p.

Linsdale, J. M.

1938. Environmental responses of vertebrates in the Great Basin. American Midland Naturalist 19:1-206.

Magee, Molly.

1964. A flat-bottomed earthenware vessel from central Nevada. American Antiquity 30:96-98.

Magee, Molly.

1966. The Grass Valley horse: a baked clay head of a horse figurine from central Nevada. Plains Anthropologist 33:204-207.

Magee, Molly.

1967. A report on perforated sherds from central Nevada with a tentative suggestion for their use. American Antiquity 32:226-227.

Molini, W. A.

1976. Chukar partridge species management plan. Nevada Department of Fish and Game. 51 p. (plus distribution maps).

Roberts, R. J., K. M. Montgomery, and R. E. Lehner.

1967. Geology and mineral resources of Eureka County, Nevada. Nevada Bureau of Mines Bulletin No. 64, 152 p.

Russell, I. C.

1885. Geological history of Lake Lahontan, a Quaternary lake of north-western Nevada. Vol. II. U.S. Geological Survey, 288 p.

Stewart, J. H., and E. H. McKee.

1977. Geology and mineral deposits of Lander County, Nevada. Part I. Geology Bulletin No. 88, Mackay School of Mines, University of Nevada, Reno. 106 p.

Stoddart, L. A.

1941. The Palouse Grassland Association in northern Utah. Ecology 22: 158-163.

Urness, P. J.

1976. Mule deer habitat changes resulting from livestock practices.

P. 21-35. In Workman, G. W., and J. B. Low, editors, Mule deer decline in the West - a symposium. Utah State University, College of Natural Resources Agricultural Experiment Station.

U.S. District Court, District of Columbia.

1974. Natural Resources Defense Council, Inc., et al., plaintiffs, vs. Rogers C. B. Morton, et al., defendants. Memorandum of Opinion and Judgement, Civil Action No. 1983-73. 3 p.

Yoakum, J.

1968. A review of the distribution and abundance of American pronghorn antelope. Antelope States Workshop Proceedings 3:4-14.

## GLOSSARY

|                       |   |
|-----------------------|---|
| AUM.....              | Animal Unit Month; based on the forage a 1,000-lb cow will consume on the range in one month. Generally given as 1,000 lb, but may be used as 800 or even 600 lb on some ranges.  |
| Browse.....           | Tender shoots, twigs, and leaves of shrubs and trees consumed by herbivores as food.  |
| Ecotone.....          | Transition area between two adjacent ecological communities usually exhibits competition between organisms common to both.  |
| Ephemeral.....        | Lasting only a very short time. In regard to annual plants, occurring in early spring only.   |
| Forb.....             | Broad-leaved herbaceous plant.  |
| Mesic.....            | Moderately moist.   |
| Pedons.....           | Unit of sampling in soils. The smallest area that accurately reflects the nature of the soil being described and from which samples can be obtained that reflect the entire soil. |
| Photosensitization... | The developing of an abnormal reaction to sunlight typically by edematous swelling and dermatitis.  |
| Pluvial Lake.....     | Lakes that occurred during the last Ice Age or Pleistocene Epoch.   |
| Seleniferous.....     | Containing or yielding selenium, an element toxic to grazing animals.   |
| Suffrutescent.....    | Obscurely shrubby, but not necessarily low. Woody at base.  |
| Topoedaphic.....      | Pertaining to specific combinations of landforms or topography and soils.   |







**U. S. DEPARTMENT OF AGRICULTURE**

SCIENCE and EDUCATION ADMINISTRATION

WESTERN REGION

1333 BROADWAY, SUITE 400  
OAKLAND, CALIFORNIA 94612

**OFFICIAL BUSINESS**

PENALTY FOR PRIVATE USE, \$300

POSTAGE AND FEES PAID  
U. S. DEPARTMENT OF  
AGRICULTURE  
AGR 101



FIRST CLASS

Return the mailing label(s) to above address if:

- ☐ Your name or address is wrong (indicate corrections, including ZIP).
- ☐ You receive duplicate copies (include labels from all copies received).
- ☐ You do NOT wish to continue receiving this technical series.